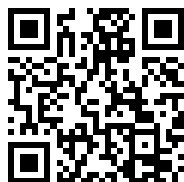
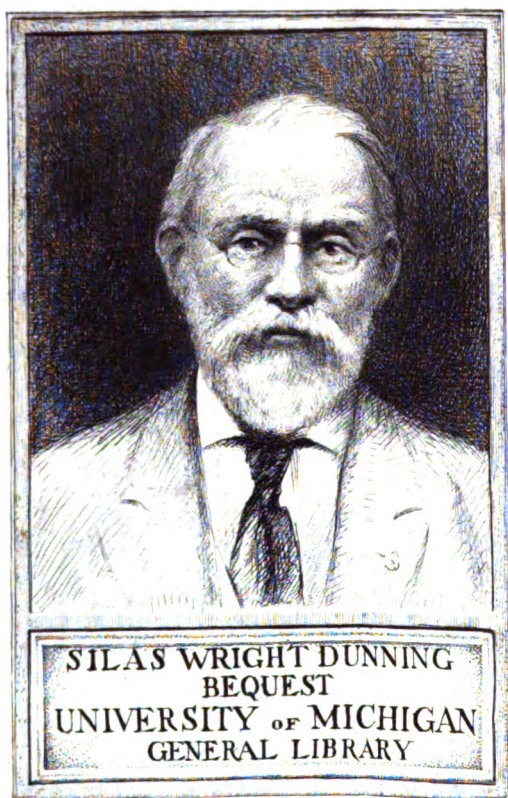

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NOTICE.

The subject of the Essay for "The Durand Medal" for 1874 will be as follows :—

On the organization of an Intelligence and Topographical Department, best calculated to meet the requirements of the Army in India. It is suggested, but not insisted upon that the subject should be treated under the following heads :—

(a) Remarkable instances when the want of information has injuriously affected the operations of British and Indian Armies.

(b) Instances in General Military History when good intelligence arrangements have markedly added to the success of operations.

(c) Arrangements for the collection of Military Information in peace and in war, either adopted by the most celebrated Commanders of former years, or at present existing in the Chief Armies of the world.

(d) Proposed organization for the collection and arrangement of Military information in peace, and for gaining intelligence in war; suitable to the Army in India, and showing in detail, cost, establishment, etc.

(e) No essay to exceed 100 pages.

(f) Open to all ranks of H. M.'s Army and Volunteers in India.

(g) Essays to be published (if deemed advisable) in the Journal.

(h) Each essay to be distinguished by a *nom de plume* and forwarded to the Secretary at Simla by the 1st November 1874—to whom also the writer's real name and address should be sent in a closed envelope.

(i) Lieut.-Colonel F. S. Roberts, Dy. Quarter Master General, has kindly consented to decide on the respective merits of the Essays.

H. H. STANSFELD, *Lieut.-Colonel,*

Secretary.

NOTICE.

MEMBERS on changing their addresses are particularly requested to notify the change to the Secretary, in order that delay in forwarding the Journals may be avoided as much as possible.

The address book is corrected up to date from the Army Lists, but mistakes are occasionally unavoidable unless members themselves promptly notify their change of residence.

Members proceeding to England on leave, who wish the Journal to be forwarded to them while absent from India should inform the Secretary, and send stamps for the overland postage by Brindisi or Southampton as they may wish.

When a member appears in orders for leave to England, his Journal is not despatched unless he asks for it, and while absent from India his subscription is not payable unless the Journal is supplied.

Members on return from furlough can obtain the numbers of the Journal that have been published during their absence by paying the subscription for that period, and all members on returning to India should inform the Secretary of the fact at once.

The paper on "Military Colonies and Reserve Circles in the Hill Ranges of India," published in the last number of the Journal (pages 25 to 33) was written by Captain F. Henderson, 107th Regiment, and was addressed by that Officer to a Meeting of the Branch Institute at Darjeeling on a renewed discussion of Col. Newall's lecture.

H. H. STANSFELD, LIEUT.-COLONEL,
Secretary.

NOTICE.

MEMBERS of the Institution who have not already done so, are earnestly requested to pay their arrears of donation and subscription, either to the Corresponding Member at their stations, or direct to the Secretary at Simla.

Many members still owe their donation and three years' subscription.

Officers, who may wish to become members are requested to be kind enough to forward their donations and subscriptions at the same time as they express a wish to join the Institution.

It is hereby notified for the information of Members of the Institution that the Exhibition of Military Drawings unavoidably postponed from last September will be held at Simla in September 1874, all drawings intended for competition to be with the Secretary by the 1st of that month.

The Prizes will be awarded by a Committee of the Council.

There is no limit or condition as to style, or subject of the drawings for this year's Exhibition, but it is considered advisable by the Council that only Military men should contribute. Drawings of Fortification and Artillery will also be allowed to compete.

H. H. STANSFELD, LIEUT.-COLONEL,

Secretary.

ORIGINAL PAPERS.

I.

LINE ORDER ATTACKS.

Being the substance of a lecture delivered at the Royal United Service Institution, Whitehall, re-written nearly throughout.

As a prelude to the discussion of the subject of my paper, I would recall to your recollection three of repeated words, which have been handed down as an heirloom from generation to generation of British soldiers,—“shoulder to shoulder.”

At the sound of these magic words what brilliant memories of the past crowd before the eyes of our imagination! What vivid pictures of fields fought and won! Even in the midst of defeat and disaster, what wondrous deeds of heroic courage, endurance, and self-sacrifice, embalmed in the annals of our history, start from their latent tomb to the freshness of present time!

These words themselves are not, I think, so much to be considered as indicative of a system of action, as the terse, concise embodiment in language of a *principle deeply ingrained* in the nature of the Anglo-Saxon race. The feeling of sticking up for and by one another through thick and thin, is the true secret of our successes by land as well as sea, and *this* is the idea so pointedly expressed in the words, “shoulder to shoulder.” To my brethren in arms I would say, hear patiently and weigh soberly, unbiassed by pre-conceived ideas or tradition worship, such arguments as I can bring forward in support of what is now to be suggested and discussed.

It is an idea that has found wide acceptance amongst British officers, that many of the evolutions of our Drill Book, though practically useless, (I refer to Battalion movements only,) are still calculated to steady both officers and men, and make them keep their wits about them and their eyes and ears open and attentive. The true value of this idea, I would humbly suggest, may be clearly estimated by due reflection on the following questions—What are the essentials of manœuvre in contact with the enemy, and under the full effects of his fire, and what can be more calculated to make leaders and led act without hesitation or mistake, than the constant practice exclusively of such movements, as alone can be executed within striking distance of an enemy, without incurring the penalty of exaggerated losses? Is it not possible in the case of average human ability, that a *superabundance of forms and details*, presented in times of peace and unruffled calmness, may in the moment

of necessarily prompt decision and action, during the thousand dangers and distractions of the field of battle, prove a stumbling block, an *embarras de richesse*,—rather than the source of ready wit and procedure? All leaders are not Moltkes and Wellingtons, all soldiers are not clear-headed and cool in action, and yet what an infinity of disaster may not arise from even a subordinate's stumbling indecision.

If then my view is right, the practice of such useless manœuvres is not only pernicious in itself, but a *serious* waste of time that might be more valuably employed.

You are all, of course, aware of the fierce controversy that has been excited in past generations, by the question of Line *versus* Column, and in our own time by that of Line or Column *versus* Skirmisher Swarms, supported by small columns. So far as we are concerned, as British officers, it may be conceded that the column of attack has neither moral nor yet physical terrors wherewith to cause our "thin red line" to slink away before it. I do not mean to say that columns are useless, but that their uses are not exactly in the foreground of the battle-field. We have not men sufficient to waste on that costly experiment.

The line formation is our accustomed mode of attack as well as defence, and long may it continue such. It is the very emblem of our national trust in our comrades and reliance on ourselves, and of the dogged pluck which urges the British soldier or seaman to close quarters, the deadly grapple and short work, cold steel in hand, with the foe. It possesses the important advantages of maximum occupation of ground, breadth of fire, and great immunity from loss. On the other hand it has in its present shape many serious disadvantages.

Any one who has closely observed the advance of a battalion in line at the quick over a couple of hundred yards of the smoothest parade ground, cannot fail to have been impressed by the sight of the hustling and loss of order, the entire cessation of fire along the line, and the helpless exposure of the whole body to the enemy's projectiles during the advance, as well as the utter inability to execute a flank attack with the rapidity and volume of fire during the change of front required under the new conditions of war. The fatal slowness of movement in advance to grapple with the enemy, firing from behind shelter perhaps, without the chance of a shot in return, cannot have escaped the eye of the reflective observer. It was the consciousness, perhaps, of this very defect, that induced the Duke of Wellington in most of his battles to play the waiting game, and thus to throw the losses and disheartening feelings of a fireless advance, on the enemy.

It would, however, be a great mistake to suppose the British soldier's only, or chief, aptitude lies in the art of defence. The whole course of our history really belies this idea. Such a fallacy can only have arisen from the accounts given of the calm unimpassioned fortitude of our soldiers, and their stubborn resistance offered under the pressure of circumstances when pitted against overwhelming numbers. Any one

who has seen British soldiers rush up to the assault of a loop-holed village occupied in force, and in that most destructive form of advance a column of sections, under a hot and telling fire as I have seen them, could hardly for a moment believe that their cue is defence alone.

The manœuvres which I shall now, with the aid of the accompanying diagrams, lay before you for discussion are intended to impart to the British Infantry line formation, the flexibility of parts and general rapidity of movement, the want of which has given birth to so many doubts as to the capacity of the time-honoured and successful British mode of attack, to withstand the withering fire of modern breech-loading arms of precision, the mitrailleuse, and the shell gun, as well as the often repeated suggestions towards its total suppression, in favor of what? The Prussian loose skirmishing order of attack, the offspring of a temporary necessity and the want of time to replace the use of the vicious system of columns persisted in till heavy losses made their voices heard on the fatal fields of France. It is then in favor of this chance-foundling of a disastrously carnaged victory that we are asked to throw aside a cherished and by no means untried formation.

A body of troops led to the assault *is only too ready to get out of hand*, to become a mass of individuals each fighting or skulking for himself, and yet we are asked to *commence an action in the state in which it usually ends!* It is not then more according to reason to devise means whereby to *preserve ocontrol ver the led as far as possible to the last moment*, than to follow that "Will o' the Wisp" order out of *disorder?* It can hardly be doubted that men *led by their own leaders throughout* will do better than those who have to rest on chance as to a leader at the vital moment. So far as concerns casualties, owing to depth or masses of men presented as a target, the Prussian swarm is really on a par with, and worse in places, than the two-deep line and this minus the order of the latter.

The Prussian successes in their late wars of surprises afford, to my thinking, no just and conclusive evidence for the adoption *by us* at least of their so-called system of fighting. There were abundant other reasons to which their triumphs can be more logically ascribed.

Was there that confidence supreme in the ranks of the French Army in the ability of their generals to lead; their vaunted commissariat to feed, cloth and supply ammunition so necessary to the moral courage of the soldier?

Was there true, lasting discipline in victory or in disaster in their ranks from lowest to highest, without which an army becomes a rabble doomed?

Was there the slightest attempt to curb the restless, excitable, hot headed and effervescent French soldier in the expenditure of his ammunition at wasteful distances, in the belief that his rapidly fired and long ranging chassépot would somehow hit somebody in the scarcely discernible German ranks?

Were the French soldiers really well fed and regularly from the outset of the campaign?

Were they efficiently supported by effective guns in sufficiently proportionate numbers?

These and many other similar questions, which no doubt will occur to you, must have reliably affirmative answers before we can with prudence even commence to discuss the propriety of skirmisher-swarms as the panacea to supersede our own form of attack and defence.

There are undoubtedly many points of Prussian organization and detail, which we would as a nation do well to examine with a view to adoption, in forms modified to suit our characteristics; but this, the least digested outcome of German experience, can scarcely be dignified into a model for us.

To secure rapidity of movement, without sacrificing the control of company commanders over their men; to obtain flexibility without degenerating into looseness; to support, if need be, the advance of a part of the battalion by the close fire of the rest, not by the fire of successive companies from one flank but *generally along the front*; to define more markedly the exact extent of each subordinate command, and thus reduce to a minimum the risk of separation of leaders from the led; and in all circumstances to preserve the power of presenting a practically unbroken front, or the British line, across the path of an enemy, I may add, to snatch for the line some of the vaunted concentration force of the column without presenting deadly mass, are the objects I have endeavoured to fulfil in the proposals I now submit for discussion. How far I may have succeeded may, after careful practice on the drill ground, be to a great extent tested at a Camp of Exercise, though war alone can obtain for us any thing like a final decision.

The changes in battalion organization, which I propose, are such as appear to avoid the charge of being very sweeping in their nature. They really amount to but a slight modification, chiefly addressed towards the use of the marksman element, in a more highly organized form and presumably to better purpose than hitherto.

I. The "fighting strength" of a battalion to be 800 rank and file, the establishment being fixed at 1000 borne on the rolls, of ten companies.

II. Companies in action to be 50 files in strength, divided into 5 sections of 10 files each.

III. *One of the 5 sections to consist of the marksmen and the best first class shots in the company, placed under the command of a "marksman sergeant," a position conferred as a reward on the eight or ten best and smartest marksmen of the battalion.*

IV. The removal of the defenceless and unemployed color party from the general combatant line to the supernumerary rank.

Fig. 1

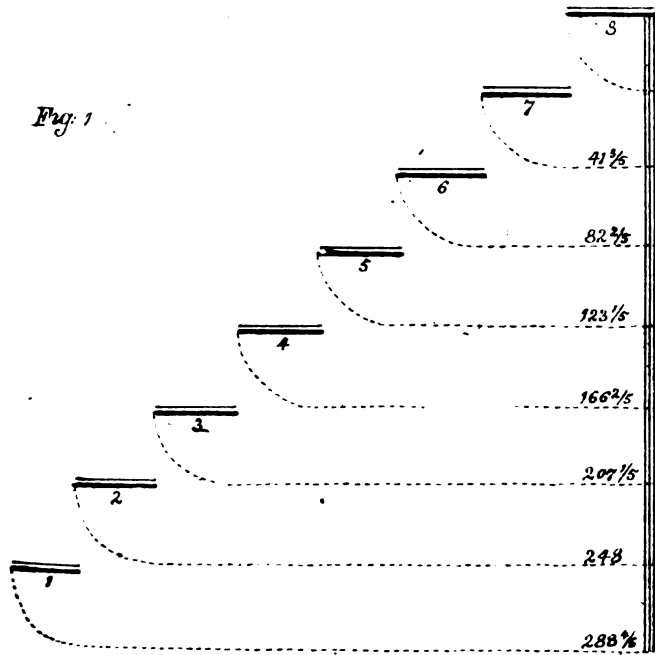
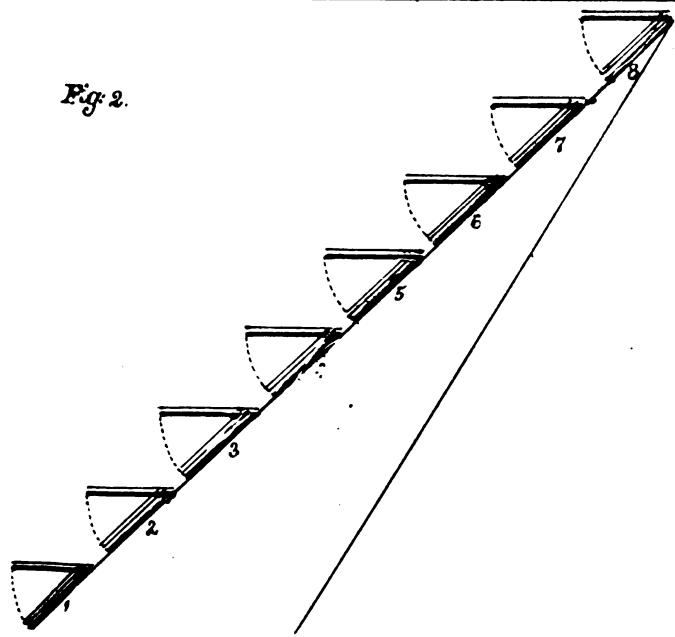
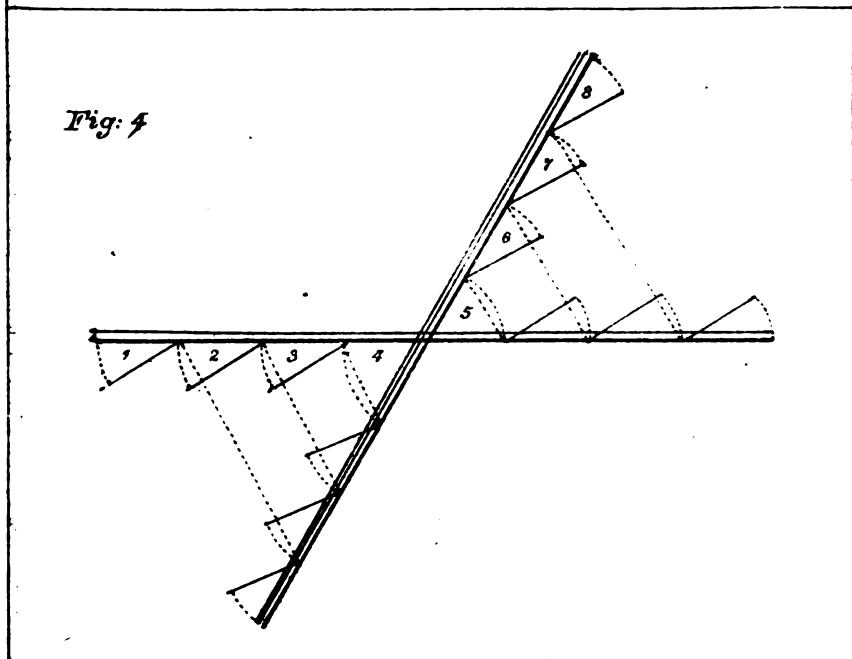
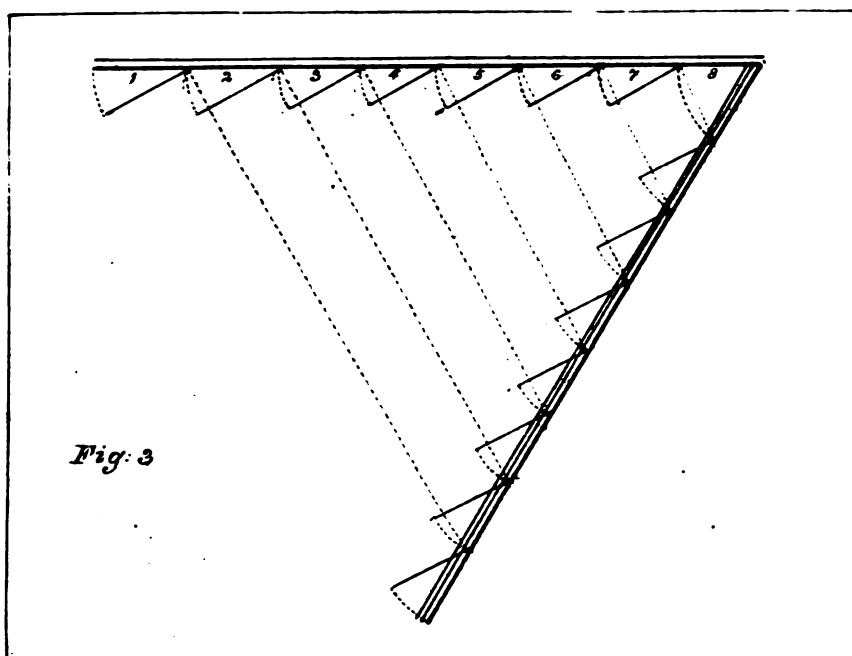


Fig. 2.





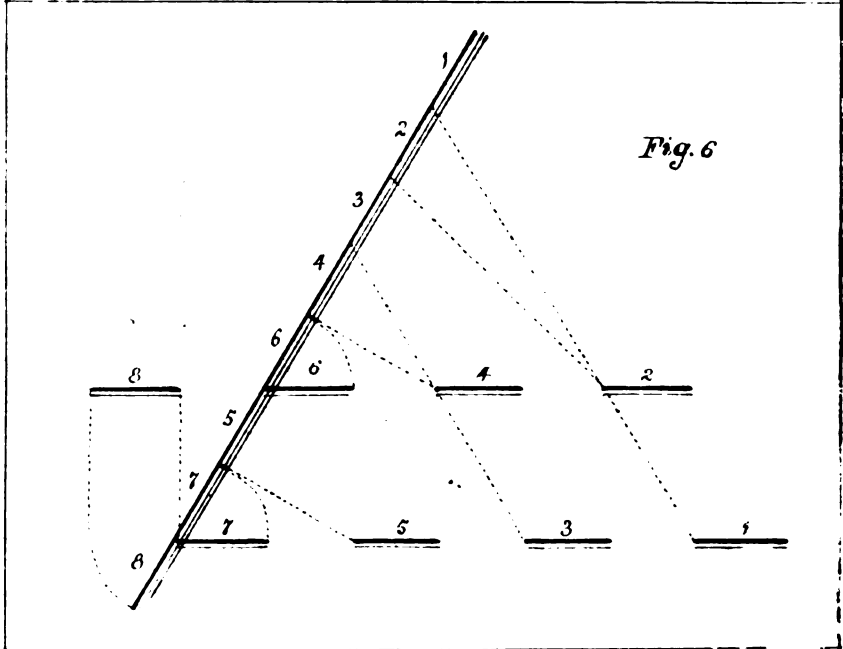
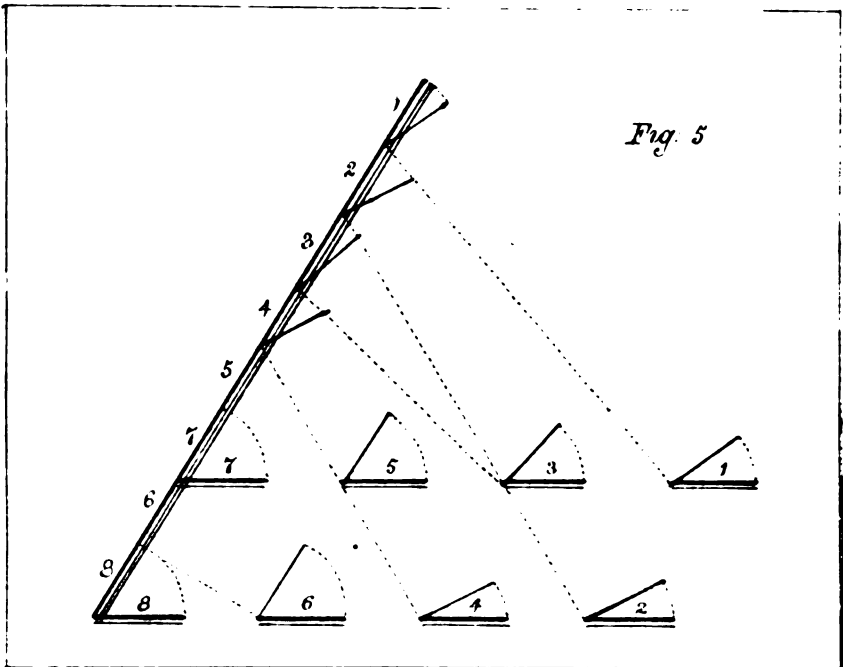


Fig: 7

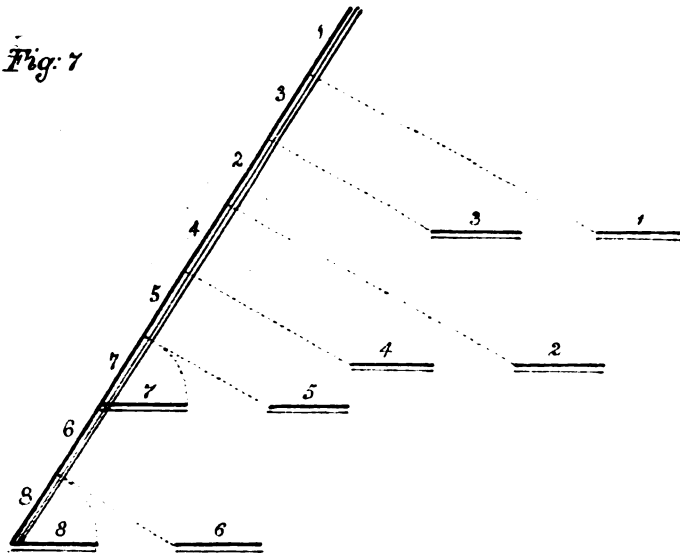


Fig: 8

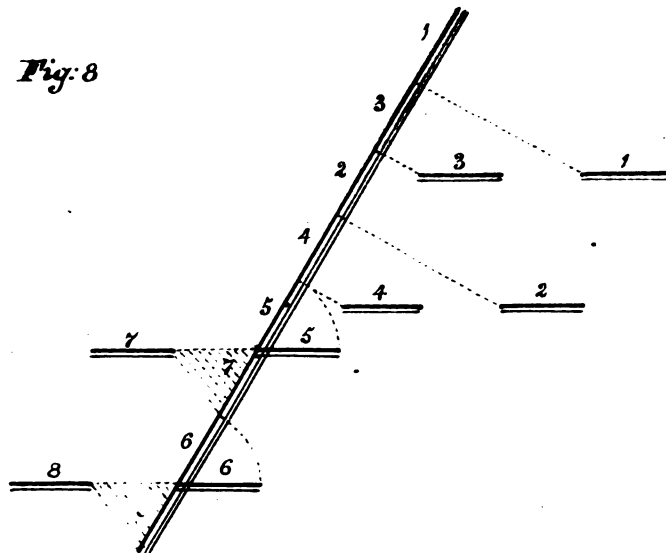


Fig. 9

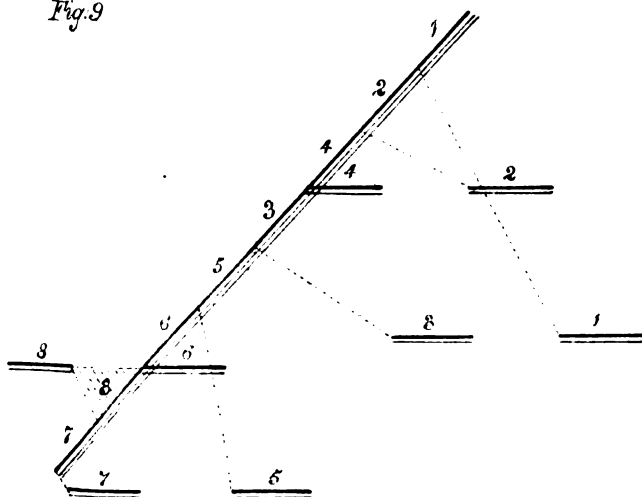


Fig. 10

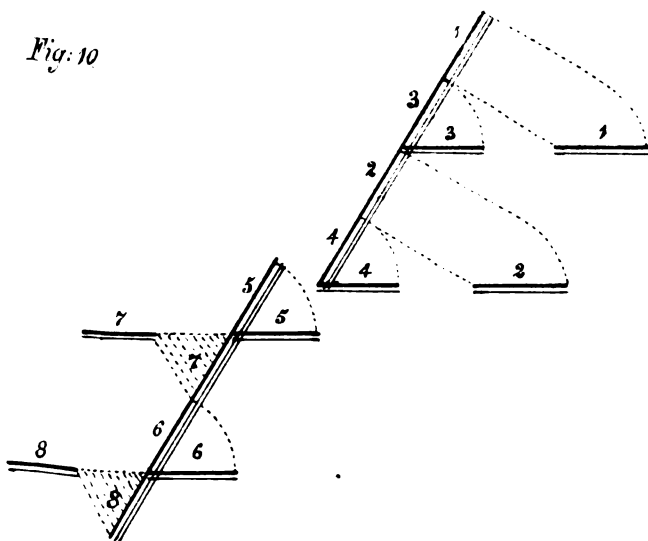


Fig. 11

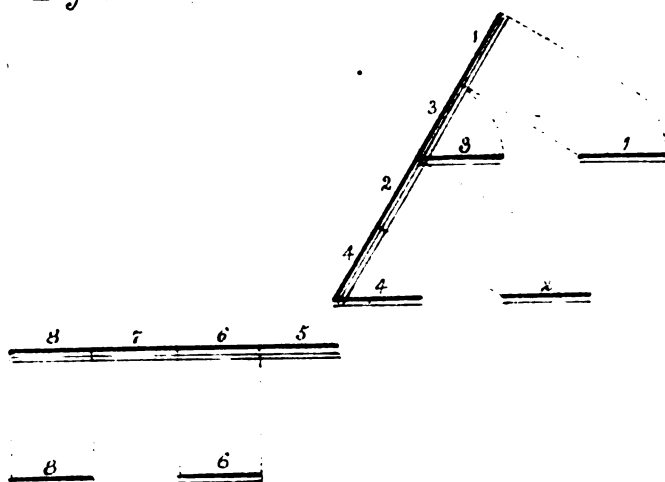


Fig. 12

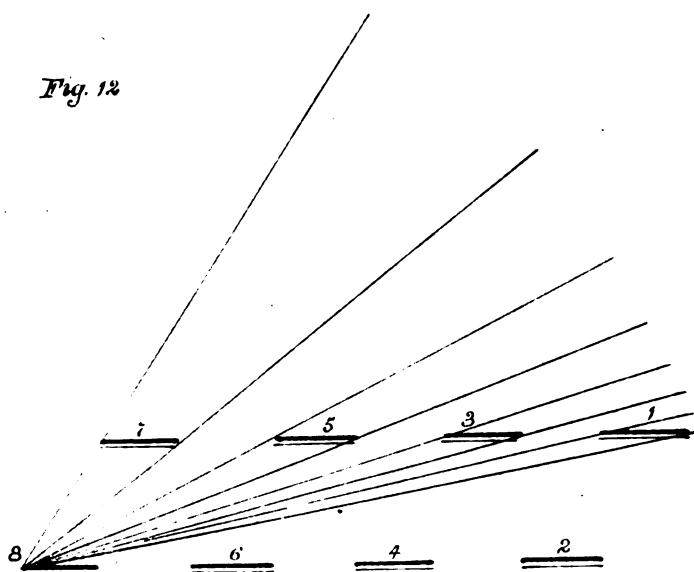


Fig: 13

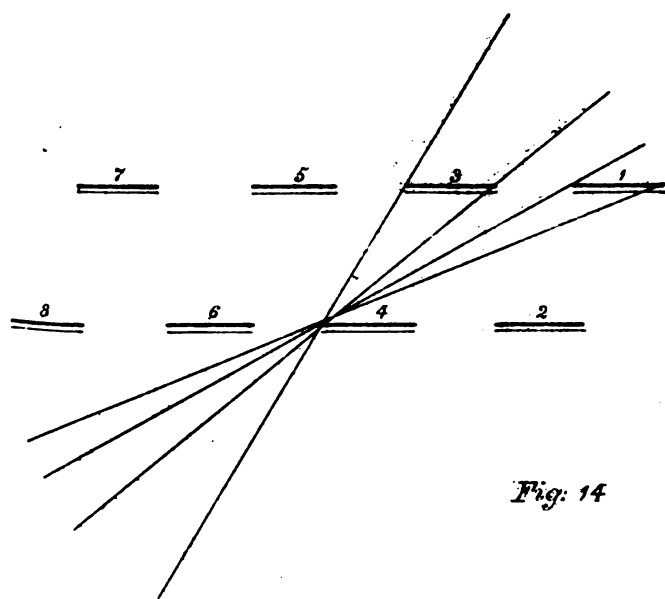
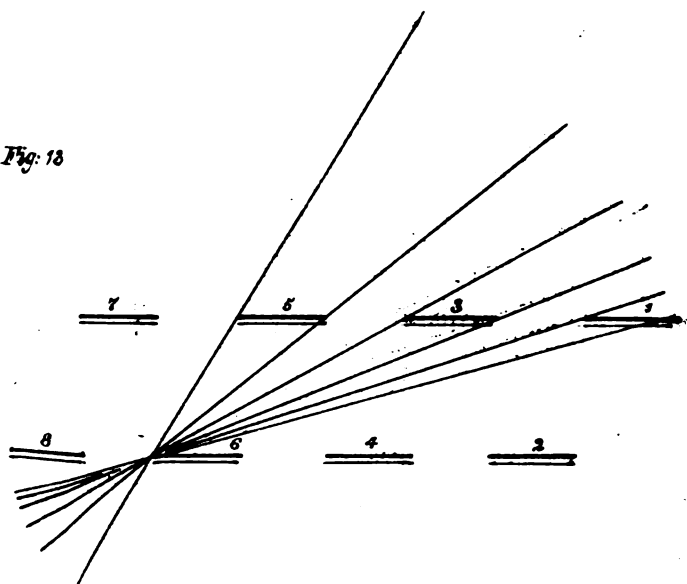


Fig: 14

Fig. 15

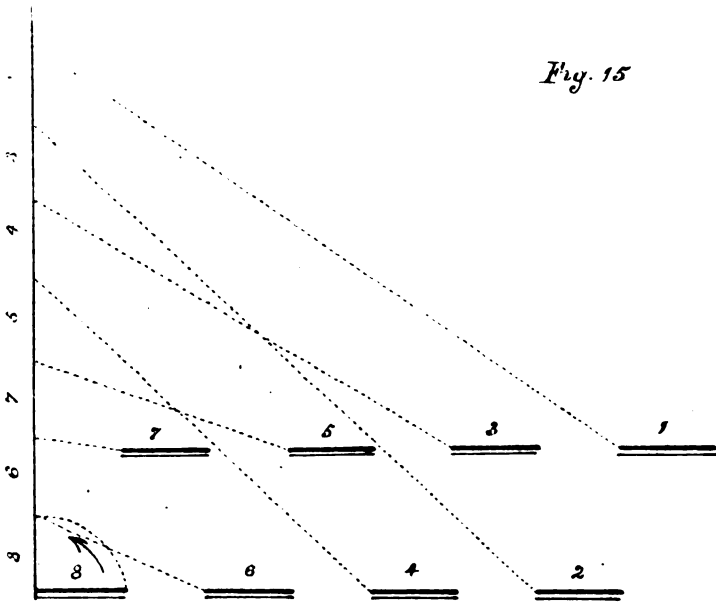
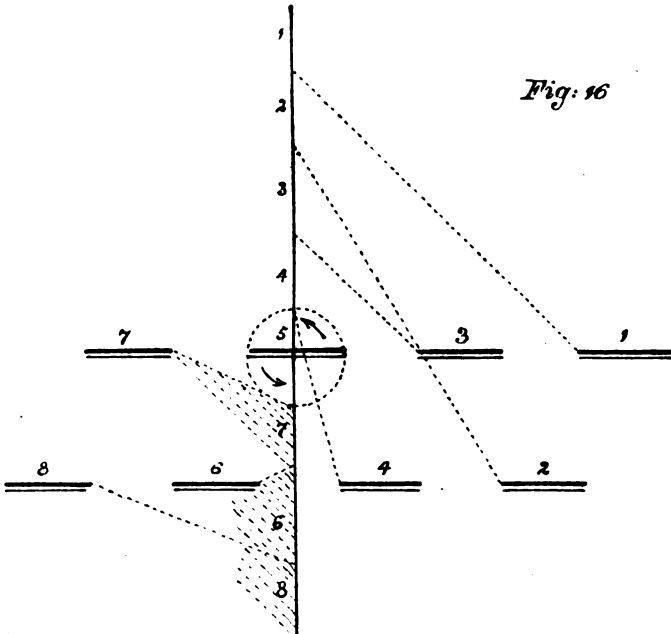


Fig. 16





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Fig. 15

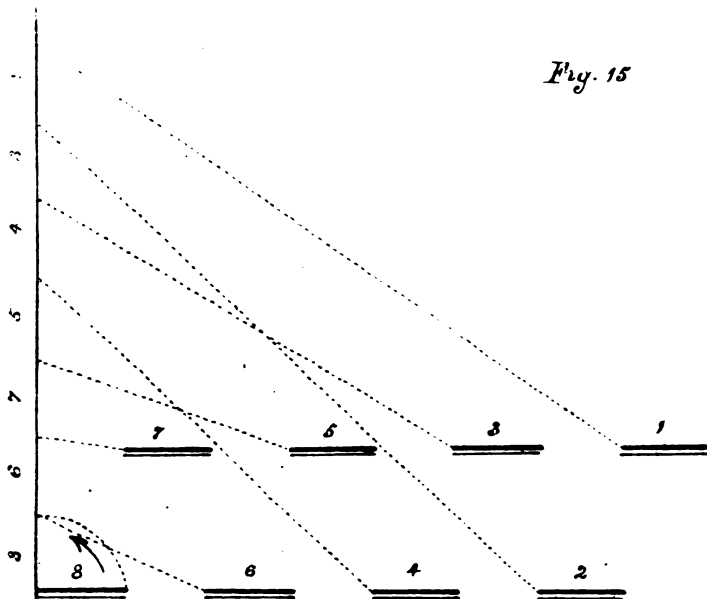
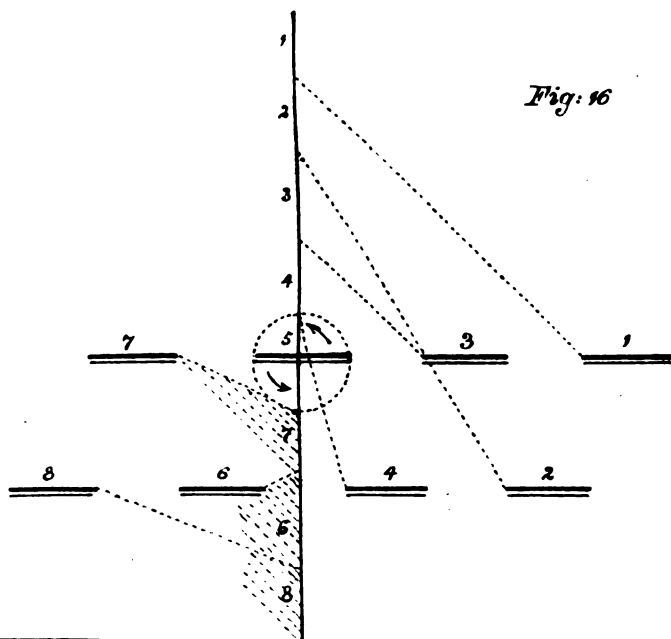


Fig. 16





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V. The habitual advance by *alternate* companies to the attack, until within fair charging distance of the enemy. The advance being made in this order, not necessarily in one continuous movement, but by fits and starts so to speak, strictly according to the circumstances of the ground, the effect of fire on the enemy's troops and the movements made by him.

Arrived within charging distance, the formation of the more rigid continuous line by the advance of the rear companies up to the front, the delivery of a volley or two, lying down and aimed low, if possible, and finally the charge "shoulder to shoulder" with the ringing British cheer—such is the nature of the changes I would suggest.

Of course, no troops should ever advance to attack prior to the preparation of its success by well handled artillery, and no mere manœuvring for the sake of itself should ever be attempted. There are however undoubtedly occasions when one is *obliged* by the enemy to manœuvre under fire. It is then that the truly tactical General shows himself and acts with decision and rapidity. It is then that the mere tradition-worshipper loses head and sacrifices hundreds to no purpose.

Possessing, as we undoubtedly do, a very large proportion of splendid shots in our Army, it seems a pity that all the labor and time spent year after year in producing them, should be in a manner wasted for the want of a system, by means of which their individual excellence may be utilized in a combined and concentrated form. Under the present system the best shots of the battalion are either left as scattered units in the general line, where their fire, by reason of the cramped space and smoke of previous discharges; must needs be greatly deteriorated in value as to accuracy; or at best they may be called out of the ranks individually, and used for some special purpose under leaders provided on the spur of the moment, there being no recognized means whereby the whole body of marksmen can be trained to act in concert with one another under well accustomed leadership.

Before proceeding further I would wish to draw attention to some points with regard to our present line formation, which have often in the course of my service impressed me very strongly indeed.

In the first years of service as a subaltern, in rear of a company, the fact of there being no interval between companies in line was often a source of uncertainty as to the exact extent my own company occupied. Of course inexperience probably had a good deal to do with this feeling; still with the captain placed as he now is in rear, I am convinced that a *slight* interval between companies would tend materially towards concentrating the attention of the company leader on the conduct of his own men, by defining to his eyes the actual extent of his command.

The distance between the ranks during the period of an advance appears to me rather too short for accelerated speed to be introduced, without great discomfort and inconvenience to the individual soldier.

The want of slight intervals between companies appears also to lead to enhanced crowding, and jostling in the line, which might frequently be remedied at once by officers commanding companies if such intervals existed.

Having divided the fighting battalion into eight companies, subdivided into 5 sections of 10 files each, and concentrated the best shots into "marksman sections," I would suggest that the latter be placed either in the centre of their companies or on their left flanks when the battalion is deployed.

I would suggest that the advance by alternate companies should be called "the line order of attack," and that it should be used over such ground and under such circumstances as the line has hitherto been used for advance and retreat.

At the battalion caution, "Battalion, advance in line order of attack covered by skirmishers, right (or left) companies to the front," the front rank men of marksmen sections to move out into skirmishing order to the extent of their companies' fronts, and act under their marksmen Sergeants, who will place themselves in the centre of their own skirmishers all lying down or placing themselves behind shelter to fire as directed by their Sergeants. The rear rank marksmen to move up into the front rank. When the skirmishing line has advanced sufficiently far the executive command "Quick, Double or Rear-march" may be given, and the companies named to lead off will move forward as directed 70 paces and lie down close to the ground. The companies left in rear to lie down at the word "march," and remain so till ordered to advance, the word of command being "Rear companies forward—march."

The prolonged advance of a battalion in this order when necessary could be conducted by sending well forward both ranks of the marksmen sections, either together or in a single line or in alternate lines, each rank forming separately and advancing alternately. The alternately advancing companies might then be moved forward, gradually increasing from the quick step to the run as found necessary by the nature of the enemy's fire; but never quite up to the skirmishing lines, until proximity to the enemy necessitates their cessation as such in favor of the volley of four companies lying down to cover by fire the advance of those in rear.

When both ranks of the marksmen sections are out, the gap left in the centre of their companies or between companies, need not, I think, *giving due weight to the rapidity of the breech loader*, be considered in any way dangerous, as it probably would have proved when our regiments were armed with Brown Bess or the muzzle-loading rifle. On the other hand the advantages of plenty of elbow room, enhanced mobility and more concentrated control by company leaders, I am thoroughly convinced from all I have seen in peace as well as war, would be very appreciable.

The special training of these marksmen sections of a battalion should be carried to the utmost degree of perfection according to the

collected and collated experience of officers who have seen much service in the field, more especially of those who have actually been in command of skirmishers.

It should always be borne in mind *even at Battalion Exercise*, that men are never to be in the erect position and exposed to the full view of the enemy, except while actually advancing from point to point as skirmishers, or as alternate advancing companies, or in the final charge which decides the fortune of the day. All not actually gaining ground or retiring under fire must invariably lie down as flat as possible on the ground or behind shelter. I would go as far even as to insist that this maxim should be carried out *invariably at all exercise parades*, as distinguished from those held for strict drill. For this purpose the soldier should be provided with an exercise or fighting dress, made of good materials and a color suitable to rough work.

The essentials of *manœuvre under fire* are, I think I may be permitted to state—

1st.—The least possible cessation of fire in return for the favors of the enemy during the course of each movement.

2nd.—The utmost possible rapidity in execution compatible with perfect order and cohesion of parts.

3rd.—The minimum exposure of parts moving.

4th.—The utmost facility for defensive action during completion.

5th.—The preservation intact of the morale of troops in actual evolution by means of self-supporting fire and strictly controllable minor units of command.

6th.—The preservation, as far as possible, of the major command in the hands of one central individual, with the greatest amount, compatible with unity, of responsible latitude for local action on the part of company and wing leaders, without impairing the fulfilment of the main object of the battalion commander's aim in *the general direction* he initiates for the movement.

I would here suggest the adoption of a small company distinguishing or rallying flag, the St. George's, St. Andrew's or St. Patrick's cross, according to nationality of the regiment, with numbers 1 to 8 embroidered in large figures in the centre. It might be on a short staff to insert in markers' rifles or to be carried by men told off as captain's orderlies.

A variety of signals could easily be given by means of such a flag.

In the accompanying diagrams I have endeavoured to show, suggestively as far as such can, the time taken by Infantry advancing "in line order of attack," either to assail an enemy or meet his flank attack; the various alternatives of front, flank, or retrogressive movement; as well as, the proportionate breadth and volume of fire that can be delivered at each stage, as compared with the corresponding manœuvres of the Drill Book of 1870.*

* The line order changes of front may mostly be performed either by companies wheeling or marching in fours; in some cases it may be needful to "form into line."

The scale upon which the diagrams are drawn is 70 paces to the inch, so that allowing for inaccuracies inherent to such drawings, any one with a pair of compasses can to a pace or two tell the comparative distances to be traversed by companies in the various evolutions I propose, to be contrasted as to time and advantages in execution.

Without going into minute details then in contrasting the system of "line order" with similar movements in the Field Exercise of 1870, I shall briefly remark the apparent advantages. I can hardly do more without greatly increasing the length of rather a long paper.

The diagrams are numbered from 1 to 18, the first 4 are Drill Book manoeuvres ; No. 11 shows an enclosing angle formed very rapidly by the use of line order echelloned by wings, a ready means for concentration of fire at moments which sometimes occur in action ; Nos. 12 to 14 show alternatives of change front less than a right angle, and Nos. 15 and 16 those possible at right angles, a very rare one in war unless brought about by such want of information as would be liable to indicate as a rule gross carelessness on the part of some superior authority. Such a change of front however to me would seem to indicate the second line as the proper place for its execution. No. 17 shows one of the methods of receiving Cavalry in "line order" when liable to the fire of an enemy's batteries. No. 18 is an example of brigade change of front from "line order" without the intervening formation of quarter columns, and increased loss from Artillery and loss of time in execution.

Before passing on to remarks on contrast, however, I would suggest as regards regimental echelon No. 1, that the advance in that order might be made with less loss perhaps, and certainly with greatly enhanced confidence on the part of the soldier, if in a direct echelon from the right the alternate companies Nos. 1, 3, 5 and 7 lay down and fired, while Nos. 2, 4, 6, and 8 came up in line with them ; these latter then lying down till Nos. 1, 3, 5, and 7 have advanced again to their proper distance and lying down commenced fire again. I offer this for what it may be worth ; no doubt it might on occasion serve a purpose. If the fire of whole companies should be considered dangerous to those advancing, the left half companies of Nos. 3, 5 and 7 only might be directed to fire.

The advantages of the change of front, Fig. 5 are as against Fig. 3, that two companies in the former wheel into line simultaneously and fire at one company in the latter figure or rather fire lying down at six companies on the move, powerless to return it ; and the complete battalion of Fig. 5 lying and firing, while two (Nos. 1 and 2) of Fig. 3 are still moving into line. Figure 6 represents the change of front when the even number (or left) companies happen to be in front ; in this although No. 7 company cannot fire at once still the change is completed while two companies (Nos. 1 and 2) of Figure 3 are still on the move.

When however the line order by echelloned wings is employed as in Figure 7 the superiority is very marked, the change of front in that figure is completed in half the time compared to that in Figure 3, and

these companies in the latter feel the effects for more or less time during a fireless advance of a whole lying down battalion's fire.

The change of front in Figure 8 is similarly complete, while Nos. 1, 2, 3, 4 and 5 companies in Figure 3 are still on the move, erect, and cheered by the sight of havoc in each other's ranks. Figure 9 represents the change made when left companies of wings happen to be in front. It is of course a slower one than that in Figure 8; but still holds the advantage over Figure 3.

Figure 10 shows line formed by wings at the same angle as Figure 3. The interval is only 22 paces, which can hardly be considered too dangerously great, and the change of front thus executed is complete while *six* companies of Figure 3 are still on their travels into their new line.

To compare the change of front on the centre of the Drill Book (Figure 4) with Figures 8, 9 and 10, in Figure 8 the change is complete while Nos. 1 and 8 companies of figure 4 are still on the march, and three companies in the latter against two in the former have their backs turned to the enemy while executing the evolution, the two companies alluded to as regards Figure 8 have their backs turned, but for a very short time, indeed. Figure 9 may be considered as equally rapid as Figure 4 all things considered, but Figure 10 has the advantage of firing at four companies moving, too with their backs presented.

Of course the "line order system" needs great attention to distances and accelerated pace and running drill; but I cannot admit the force of some of the arguments advanced as to bits and spaces fitting to one another in action. Steady practice, carried out conscientiously by officers and non-commissioned officers during time saved by the absolute abolition of all useless so-called eye and ear sharpening manœuvres, which I need not here particularize further, will, I feel as convinced as that I am now writing, serve to perfect the companies of a battalion in passing over to a nicety the short spaces necessary for line order evolutions as well as preserving those distances.

The truth or falsity of my conclusions can readily be tested so far as tests can be applied in peace times, at a Camp of Exercise, after a previous few months' patient and unprejudiced training of a few regiments in the proposed formation, and if the manœuvres fail we shall at least have the satisfaction of knowing; not only that they *have* done so, but also wherein the weak points lie. This last in itself will be valuable as the possible seed from which improvements in the tactics of the future may grow.

With these remarks I will now conclude, by introducing to my professional brothers the improved form of a "soldier's scoop, pick and rifle rest," which I had the honor of presenting on a former occasion.

The special conditions involved in the construction of such an *assailant's* intrenching tool as we want so much, I may perhaps be permitted to say, appear to be strength, durability, lightness and portability,

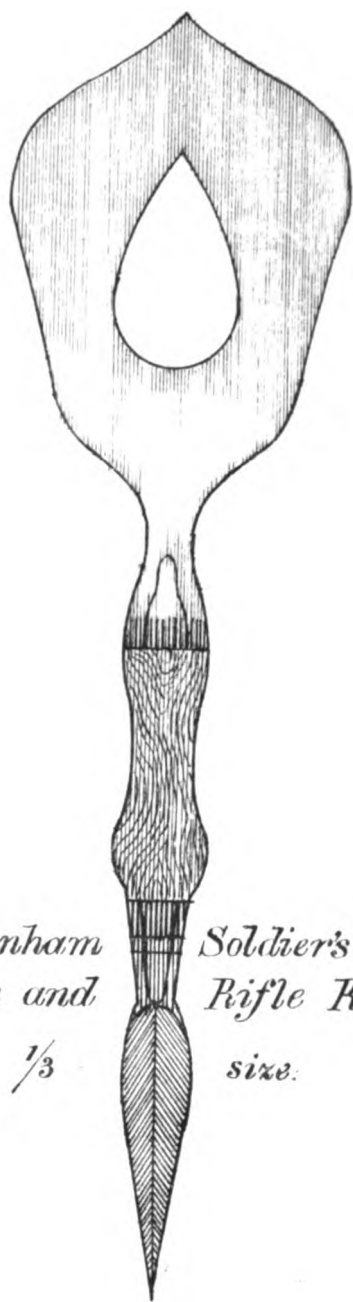
in size, and weight, convenience of shape *for carriage on the soldier's person*, simplicity of construction, rigid unity as a whole, capability of use as pick, shovel and jumper by the soldier, with the least possible exposure of his person to the enemy's fire, and with proper instruction and practice at the minimum expenditure of breath and muscular steadiness. It must in short be an implement which, owing to its general convenience and reliability in size, weight, strength, portability, and practical utility, is not likely to be out of the *personal possession of each individual soldier* under whatever circumstances he may find himself.

The improved scoop can be made $21\frac{1}{2}$ ounces in weight as against 32 ounces, the weight I believe of the one tried at Roorkee, as described in No. 3 of the *Journal of the United Service Institution of India*.

The diagram annexed will explain itself.

A piece of calico or other light and tough material 46 inches by 24 inches, may, with aid of a light tin or wire tube 3 inches in diameter and 12 inches in length, be turned in a most effective shelter bag, and serve the soldier as his bivouac or barrack-room pillow as well. His waterproof sheet may be carried, rolled up in the hollow of the tube, the real object of which latter in action is to fire through, when the soldier is lying down. The shelter bag can I know be made weighing fifteen ounces.

HENRY L. A. TOTTENHAM, CAPTAIN,
Wing Officer 38th Regiment Bengal Native Infantry.



*The Tottenham Soldier's Scoop,
Pick and Rifle Rest.*
1/3 size.

II.

BREECH-LOADING WEAPONS WITH SPECIAL REFERENCE
TO THE ARMAMENT OF BRITISH SOLDIERS.

P R E F A C E.

THE writer of the following memoir disclaims all pretence to originality in his work. His matter, frequently expressed in the words of the original, is taken, chiefly, from some very able papers on the subject of Military Breech Loaders, by Captain Majendie, of the Royal Laboratory, Woolwich, and from other reliable sources.

His wish has been to bring before his brother soldiers, in this country, in a form comprehensive, but at the same time concise, an important subject, which he trusts will not be uninteresting to them.

THE idea of loading weapons at the breech, is by no means a modern one. From the earliest days of fire-arms, some four centuries ago, breech-loading guns were rather the rule than the exception, and it was probably the mechanical difficulties of the problem, requiring not only mechanical, but scientific knowledge to overcome, that obliged the gunsmiths of those early days, to abandon their bold conceptions, for want of skilled hands to carry them out.

Their efforts have not however been entirely without fruit, for M. de Burghat writing on the arms exhibited in the Paris Exhibition of 1867, divided the then existing breech-loaders into six classes, five of which were represented in the guns of the 16th and 17th centuries. In the matter of simplicity, some of these early guns compare favorably with their modern models, while there exists a weapon in the museum of the United Service Institution, the invention of an Italian genius in 1661, which rivals the most modern breech-loader in rapidity of fire, if the extraordinary performance claimed for it, of self-priming and firing twenty shots in a minute, with all the difficulties of a flint lock, loose powder and ball, be credited.

It is a very general impression that the armament of the British soldier, with breech-loaders, sprang directly from the performance of the needle gun in Prussian hands, in the Campaign of 1866. Such however is not the case, but is rather due to the gradual perception of the necessity for such a step, which had grown up in the nation, and to the energy and foresight of our military authorities.

As a matter of fact it had been determined in the year 1864, that our Infantry should be so armed, and the actual pattern of arm to be adopted, the Snider Enfield, had been decided upon in 1866, more than a month before the decisive battle of Koniggratz was fought.

Undoubtedly the Austro-Prussian War stimulated the action, and strengthened the hands of the War Office authorities, proving so clearly as it did, the serviceability of a breech-loading system, in actual warfare

Another fact not generally known is, that no less than 14 years ago, a breech-loader was in use in the British Army. Two regiments of British Cavalry were at that time experimentally armed with Sharp's breech loading carbine.

Comparing this weapon with more modern breech-loaders, one finds several defects.

It had the hammer and percussion cap arrangement.

It had no effective mechanism to check the escape of gas, and the whole task of this was thrown on the arm.

In loading, the back end of the cartridge was cut off, and much of the powder was unavoidably sprinkled about the breech, so that the firer's face was usually burnt from firing, and the fouling from the gas escape, after a few rounds, clogged the breech mechanism and it became very difficult to open and close.

Altogether Sharp's carbine, though certainly easier to load, was not a pleasant weapon to have to deal with.

In 1857 however, breech-loading was considered solely as a means of convenient loading, and was looked upon altogether as a Cavalry question.

Muzzle-loading was difficult on horseback, and it was thought very desirable to relieve the Cavalry soldier, mounted perhaps on a frightened horse, of the inconvenience of trying to pour powder down a narrow tube, to put a bullet on the top of it, and finally to put a cap on the nipple of his arm.

Between 1857 and 1861, other breech-loaders were introduced for use in the Cavalry; amongst them the "Terry carbine," and the "Westley Richards." In 1861, the latter arm was decided upon for that branch of the service.

The breech closing mechanism consists of a plunger, which hinges on the back part of the barrel, and is turned over when the arm is to be loaded.

When the loading is completed it is shut down—in the act of closing the plunger is pressed forward into the barrel, so as to effect a fairly tight joint, the prevention of the escape of gas being materially assisted by a greased wad placed at the back of the cartridge, which, when another cartridge was inserted, was pushed forward, and acted the part of a lubricator.

The adoption of this arm was a decided step in advance; it was an accurate weapon; one could fire six or seven shots a minute with it, easily; it was a fairly safe weapon, though accidents did happen occasionally with it, such as the breech blowing open; it retained however the percussion cap and hammer. As a capping breech-loader it still holds its place, as the most effective produced.

Hitherto the true scope of the question had not been understood, and general ignorance prevailed of the development of which breech-loading arms were capable, and which they were shortly destined to receive

Misconceptions existed also on the subject of ammunition. Strong objections were made to cartridges containing their own ignition, as it was alleged, that they were more liable to accidental explosion, and that did one explode in a barrel, it would ignite the remainder.

No doubt objections of this nature caused the stagnation which for some time hung over the question; taking them for granted, men were confined in the range of their enquiries.

When however experiments were made to determine the liability of small arm ammunition to explode in bulk, it was found not only that the explosion of a single cartridge did not explode the rest, but that the explosion of several cartridges or even of $\frac{1}{4}$ lb of loose powder, though it destroyed the barrel, and damaged the cartridges, did not cause a general blow up. This result threw considerable light on the breech-loading question.

Between the years 1859 and 1864 many different forms of breech loading were introduced, and breech-loading rifles and guns, with self-igniting cartridges, were generally used for sporting purposes.

In the latter year, during the campaign of Austria and Prussia combined against Denmark, it was clearly proved how valuable was the needle gun, or rather the system of which it was an example.

It was no longer a question of an arm which might be more easily loaded, but which offered no other advantage, but it became a question of adopting an arm which would increase three or fourfold the fire of an army, would place as it were three or four rifles in each man's hand.

So obvious was the teaching of this campaign, and so urgent was the necessity for quick action considered, that Lord de Grey, then Secretary of State for War, appointed a committee, of which General Russell was President, Lord Longford, Colonel Clarke Kennedy, and Colonel Steele among its members, to "report upon the advisability of arming the Infantry in whole or in part with breech-loaders."

On the 11th July 1864, this committee signed a report to the effect that it would be desirable to arm the whole of the Infantry with breech loading rifles.

Next came the consideration—What breech-loading rifle to adopt? and this question had to be considered from two points of view. Whether was it best to adopt a new arm or attempt to utilise the 600,000 rifles we had in store? The first was a complete way, provided we went into questions closely united with breech-loading, such as the best size of bore, the best way of igniting the cartridge, and the best form of cartridge, &c.

The second had the advantage of being a cheap and speedy way of solving the immediate problem.

Some might ask, why not adopt the needle gun? Here was a complete system, ready to one's hand, tried in actual war, and inexpensive. Well the needle gun as it was in 1864, and, as it is now with all its recent improvements, is a clumsy weapon, awkward to manipulate, and altogether far inferior in make to the rifle that is usually placed in a British soldier's hands.

The end of the barrel of the needle gun is cut away for a short distance so as to form a slot. The barrel is closed by a bolt moved by means of a small knob fixed on it. When the cartridge is to be inserted the handle or knob is turned a $\frac{1}{4}$ turn to the left, and the bolt is drawn back; when loaded the bolt is pushed forward and locked by turning it to the right, exactly on the principle of a common door bolt.

The bolt is hollow, and is so turned at the end that it fits closely into the end of the barrel.

The steel needle, which gives the name to the gun, and by which the cartridge is exploded, works in the bolt, and is driven forward by means of a spiral spring. The spring and needle are set by means of a trigger. The action of another trigger releases the spring; the needle darts forward into a patch of detonating powder in the centre of the cartridge.

The cartridge is paper wrapped; the projectile is much smaller than the bore, weighs 480 grains and is fixed in a papier mache sabot, which, fitting closely into the bore, imparts the action of the grooves to the bullet. The fulminate is contained in the base of the sabot; by means of the sabot all gas escape round the projectile is prevented. The powder charge of 70 grains is formed of very fine powder, so as to offer very little resistance to the passage of the needle.

The action of the needle gun is slow, its rapidity of fire being about half that of the Snider Enfield, and only about twice as rapid as a muzzle-loader.

The cartridge being of paper, and being wholly consumed after each discharge, the gas check is thrown entirely on the arm, at the junction of the breech. However well the bolt or plunger may fit at first, it becomes loose, and, if the arm be not looked to, the gas escape becomes inconveniently great. This sometimes induces the Prussian soldier to deliver his fire from the hip.

The needle and trigger require careful clearing, and the former is liable to become bent, and injured. To meet this liability the Prussian soldier carries two or three spare needles. The replacing a needle takes a certain amount of time, and meanwhile the arm is temporarily disabled.

The ammunition is open to many objections; it is liable to suffer damp, and is not adapted to bear much rough usage.

We might have improved upon the mechanism of the needle gun and have adapted it to our needs, but we should not under these circumstances have been adopting a ready made system; therefore that argument falls to the ground.

At this time, no other system satisfied our requirements—I am speaking of 1864 and Government therefore determined to endeavour to convert our existing store of muzzle-loaders into breech-loaders. So far as its shooting qualities were concerned, the Enfield rifle was a good military arm. It has been irreverently called a “gaspipe,” and of course has been left far behind now; but after all a match rifle is not wanted for military purposes, moderate accuracy is quite sufficient. What are the circumstances, in which for the most part the soldier uses his weapon? The “war picture,” drawn by the German author in his pamphlet, entitled “Prussian Infantry in 1869,” enables one to form an idea. He says, “the bullets whistle and men are seen to drop. Right and left rattles the skirmishing fire; now a shell explodes and causes an involuntary “ducking;” amid the smoke an enemy’s column looms in sight. The company is ordered to load, it halts and makes ready; here the men are crowded; there, in loose order; some do not see the enemy at all, others have not heard the word of command. The enemy’s bullets come thick in among them, and before they can make ready many fall wounded. Present! the arms are severally pointed in all directions, in the confusion and alarm; first a few, then more are fired” and this is a picture of Prussian Infantry!

Having arrived at the determination to utilise the Enfield rifle, if practicable, the next step of the Government was to issue an advertisement, inviting gunmakers and others to submit propositions for its conversion into a breech-loader.

In reply to this invitation which was issued in August 1864, no less than fifty different systems of conversion were submitted. Their consideration was referred to a committee, of which Colonel Baynes was President. The first step of the committee was to subject these weapons to a weeding process, and when this was accomplished, but eight were left to be further experimented upon, and out of this number ultimately, only five came to the post.

Four of these were capping arms, for even then we had not learnt to regard non-capping as a *sine quâ non*; one was non-capping.

Westley Richards’ Mount Storm’s guns and Wilson’s converted Enfields, competed against the Snider, the sole example of the non-capping system.

Westley Richards’ converted Enfield was much the same as the Cavalry carbine of 1861 already described. It had in addition, a small hook at the end of the plunger, to withdraw the greased wad at the base of the cartridge.

Mount Storm’s system consisted in cutting about $2\frac{1}{2}$ inches off the breech end of the Enfield rifle, and substituting a moveable hinged chamber for the reception of the cartridge and bullet.

The chamber works on a hinge in front, which permits of its being turned completely over on to the barrel ; or it may be so arranged as to stand at right angles to the barrel, for facility of loading with loose powder and ball.

When loaded, the chamber is shut down, and is secured in its place by a bolt worked by the lock. Gas escape was prevented by an expanding metal ring on the face of the chamber.

In Wilson's system the breech of the original arm is removed, and the barrel prolonged backwards in the form of a slot, for some inches.

The cartridge is inserted at this slot, and pushed forward into the barrel, the breech is then closed by a sliding bolt, which is secured by a metal pin passing through the stock and plunger.

An India rubber washer is fitted into the barrel, to assist in preventing the escape of gas.

The Green system of conversion is very similar to the Wilson. Like the latter, the breech is closed by a bolt or plunger : but this is furnished with a lever handle, and is kept in place by being turned $\frac{1}{4}$ circle to the right,—a similar arrangement in fact to the needle gun. In this system is also, an India rubber washer to prevent gas escape.

The Snider converted Enfield is now so familiar to all, that a very brief description will suffice for it.

The breech mechanism, as a whole, is now screwed on to the end of the Enfield rifle barrel, in what is technically termed a "shoe."

The breech block hinges on a side pin, and works backwards and forwards, being kept in place by a spiral spring. The ignition of the charge is effected by means of a small striker or piston, working through the breech block.

A blow of the hammer on this sends it forward one-tenth of an inch, into the cap fixed in the centre of the cartridge.

The piston is returned by a spiral spring, and the empty cartridge case is withdrawn by means of a claw on the breech block. The extractor is returned by a spiral spring.

Mr. Snider's right to claim this invention as his own, has been disputed. It has been claimed by a Frenchman, and also by a Mr. Drake, a fellow countryman ; if however, we wish to trace the system to its original source, we have to go back a long time. There exists in the Tower of London, at this day, a short breech-loading gun of the time of Henry the VIII, which has identically the same plan, for opening and closing the breech, as the Snider. It is a matchlock gun, and has a separate pan for the priming, which was fired by the matchlock. The charge was contained in an iron cylinder, which fitted into the barrel, and could be taken in and out at pleasure, for loading purposes.

The series of experiments with the above mentioned weapons began at an early date in 1865.

As regards rapidity of fire, the Snider eclipsed its rivals, being 50 per cent quicker. While the capping breech loaders could fire two shots to one from a muzzle-loader, the Snider could fire three.

As regards accuracy, the latter arm was bad with the ammunition supplied by Mr. Snider for its use; so bad, that all hope at one time of adopting the system was abandoned. The Westley Richards was very superior in this respect.

Among the capping arms, the Mont Storm ranked first, and it was recommended for application to a certain number of rifles for further experiment. It however failed subsequently, partly on account of the breech mechanism; and partly because of the unsuitability for general service, of the skin wrapped cartridge used with it.

Here we may remark "en passant" that all cartridges for capping breech-loaders, or muzzle-loaders, must be wrapped in some substance so thin, that the fire from the cap will pierce it, and that the whole cartridge may be consumed, so that all danger in re-loading may be done away with.

A military cartridge has to stand a good deal of knocking about, and must therefore be strong. Skin or any weak thin substance cannot be therefore a good wrapping.

The Mont Storm failed not only in its ammunition, but in the arm itself.

The hinge of the chamber broke with proof charges, as also the small bolt, by which the chamber is locked in place. For these reasons all idea of adopting the system was abandoned.

As it was obviously from defective cartridges, that the Snider rifle failed in point of accuracy, the question of suitable ammunition for it, was referred to Colonel Boxer, the Royal Laboratory, Woolwich, and he succeeded in manufacturing ammunition, with which satisfactory shooting results were obtained.

Colonel Bayne's Committee recommended that the Snider system conversion should be adopted for the Enfield rifle; their recommendation was finally approved by Lord Hartington in May 1866.

In every respect, the Snider converted Enfield, with the Boxer ammunition, has proved a decided success.

As many as 70,000 rounds have been fired from one arm, which still remained perfectly serviceable. Few casualties have occurred with it; out of 99,840 rounds fired, casualties of all sorts amounted to one in 400.

For rapidity of fire, safety, simplicity, easy loading, easy extraction and non-liability to get out of order, the system has proved everything anticipated for it.

Its cost of conversion is something under one pound per arm.

The latest pattern of Snider Enfield is fitted with a safety locking bolt, in the breech block.

An arm having been determined upon, for the immediate use of the British Army, there remained to consider at leisure, what should be its future weapon, for the manufacture of new arms having been stopped for two or three years, while the conversion question was pending, the country was without a reserve store of rifles.

The War Office, on the 22nd October 1866, issued an advertisement "to gunmakers and others, inviting proposals for breech-loading rifles, either repeating or not repeating, which may replace the present service rifles, in future manufacture."

Certain general conditions were stated. The arm was to be of such simple construction, that it might be used by imperfectly trained troops, and was not to be inferior in general qualities to the Naval Snider Enfield, which was adopted as a standard of comparison.

The size of bore and twist of the rifling was left optional.

The ammunition was to fulfil certain general conditions, to be as little liable to injury by rough usage, and damp as the Boxer cartridge, which was taken as the standard of comparison.

A reward of £1000 was offered for the best arm submitted—of 600£ for the rifle which had the best form of breech mechanism.

A 300£ prize was offered for the best magazine or repeating arm.

For the best cartridge, looking less to its shooting qualities, than to its cheapness of manufacture, power of sustaining rough usage, and capability of withstanding the effects of climate, a prize of 400£ was offered.

The arms and ammunition were to be submitted for experiment not later than the 30th March 1867.

The year 1867 must be marked as one of great activity in the matter of breech-loading; many were the systems then and previously invented; but numerous and diversified though breech-loaders were, and are, they may be divided into two great classes.

1st, breech-loaders, taking the term as usually accepted; and 2nd Repeaters.

The 1st class may be subdivided, into chamber-loaders and breech-loaders proper. "A chamber-loader may be described as a muzzle-loader cut short, and so arranged that the gun can be easily loaded by

hand, without a ramrod." "The charge is deposited in a short chamber, and the chamber is then placed in position for firing along the prolongation of the barrel." "The Mont Storm was such—having a front hinge. In some rifles, the hinge is placed behind, and this is probably the most primitive form of chamber loading."

In a capping chamber-loading rifle invented in Denmark, the barrel was made to turn on a swivel over the breech, thus inverting the ordinary process, and producing a most inconvenient arm, more difficult to load, even than a muzzle-loader.

Colt's pistol is an example of another chamber-loader, having several chambers; the chambers are not hinged, but are brought up by machinery, in succession into the prolongation of the barrel.

There are many forms of chamber-loading rifles, but this system is more in favour abroad than with us. Its defects are that the chamber mechanism is liable to injury from the explosion of the powder charge.

Breech-loaders proper are very numerous. The Snider, Westley Richards, needle gun, chassepot, and most sporting guns and rifles are breech-loaders properly so called.

In such guns, as a rule, though there are exceptions, the work of resisting the explosion of the powder is thrown either on the gun and cartridge, or chiefly on the cartridge. In the needle gun, the chassepot and Sharp's carbine, the whole gas escape is thrown on the gun, with the result, in each of these weapons, of an escape, sometimes excessive.

It is undoubtedly sounder in principle, and safer in practice to throw the burden of resisting the gas escape on the cartridge, which has only to sustain it once, than on the gun which has to sustain it, many times.

The other great family of breech-loaders, repeaters may be divided into revolvers, and magazine guns.

Revolving pistols are examples of the former, and rifles are made chiefly in America, on the same principle.

Of magazine arms, there are two varieties—1st, a simple repeating rifle as "Henry's," not to be confounded with the "Henry rifle," which draws its supply of cartridges from a magazine under the barrel, and which, when this is exhausted, becomes temporarily hors de combat. 2nd, an arm provided with a magazine which can be used as a repeater or as a simple breech-loader, at will.

Whether the magazine be full or empty, this firearm can be loaded and fired independently of it, as any other breech-loader; but if required, by a simple motion, the magazine cartridges may be called upon, and a tremendous fire delivered, without taking the arm from the shoulder.

The Spenser rifle, an American invention, is of this description; the magazine being situated in the stock.

The machinery of such arms is complicated, and liable to get out of order. Could this defect be remedied, a magazine rifle would have many advantages over a breech-loader, not only for Cavalry and Artillery, but also for Infantry.

There are certain general requirements in a breech-loader for military purposes.

It must be capable of delivering a rapid fire; it must be a safe arm; and this condition involves freedom from escape of gas.

It must not be easily liable to injury from rough usage, fouling, damp, or the action of discharge. It should have a moderate degree of accuracy, combined with a low trajectory, and it must be a hard hitting weapon. In other words it must have great penetration.

The ammunition must be safe, durable, if possible, waterproof; perfectly reliable and serviceable in different climates, and lastly, when all these requirements have been satisfied, it should be cheap to manufacture.

In answer to the Government advertisement, no less than 104 rifles were entered to compete for the Government prizes, and a committee of which Colonel Fletcher was appointed President, assembled to consider them, and fix upon the best weapon for the use of the British Army. The task before the committee, considering the varied requirements of our troops, and the indispensable details above mentioned, was by no means an easy one. They commenced their work in April 1867.

Of the rifles submitted, sixty-seven were at once set aside, as they did not fulfil the Government conditions, as stated in their advertisement. Some were too long, some too short, while others came in too late.

The Committee proceeded to test the remaining thirty-seven; and this stage of their proceedings, though for the most part monotonous, was here and there relieved by occurrences ludicrous in their character.

Some inventors were excessively cautious, other again, rash to an extreme. One would imagine, that it was a fundamental requirement of any fire-arm, that it should be capable of being fired off. Some inventors however, refused point blank, to run the risk of firing off their own particular bantlings. One gentleman stretched a point so far, as to express his willingness to fire one shot, but one only, from his own arm. Another was a victim to misplaced confidence in a "safety bolt" so called, which exhibited its efficiency, by allowing the breech to be blown out in the firer's face. One of the competing rifles failed in the hands of a certificated marksman to hit a target twenty-eight feet square, once in eight shots at 500 yards.

Such were some of the weapons, with which it was proposed to arm the British soldier; their production showed how utterly ignorant were their inventors of the requirements of military service, or indeed of any service whatever.

Gradually, as they failed to satisfy the tests applied, the number of rifles eligible for further competition was reduced, and finally there remained but nine.

They were the Albini and Brösedlin, the Burton one and two, the Fosberry, the Henry, the Martini, the Peabody, and Remington. To each inventor a sum of £300 was given, and he was required to furnish six arms exactly similar to the specimen weapon, together with 1000 rounds of ammunition per stand.

The further competition with the arms so supplied, commenced on the 29th October 1867, and the Committee made its report on the 12th February 1868.

None of the rifles had reached the standard of accuracy (and it must be remembered that the Snider converted Naval rifle had for purposes of comparison been taken as the standard) and the first prize of £1000 was withheld.

The prize of 600£ for breech mechanism was given to the Henry rifle.

The Henry rifle is a small bore, its breech mechanism is similar in some respects to that of Sharp's carbine, the great difference between them being, that while in the latter a consuming cartridge was used, in the former, Boxer ammunition is employed, which materially assists in preventing the escape of gas. The breech is closed by a sliding vertical breech block, which is lowered for the admission of the cartridge, by means of a lever under the trigger guard. The striker passes diagonally through the breech block, and is struck by a hammer of the ordinary pattern. The extractor is worked by the action of lowering the breech block.

The small bore Boxer cartridge was used with it, giving fair accuracy and a rapidity of fire of twelve shots in fifty-seven seconds.

One may pass by the other rifles, noticing however that the Martini not only received no prize, but was placed seven on the list.

The question naturally occurs to me; how is it that while the Henry obtained the prize for breech mechanism, the Martini breech mechanism is now adopted in the composite Martini Henry rifle?

The answer is, that the Martini failed entirely through defects in ammunition, and from this one may learn something; it is that a breech loading arm stands or falls with its ammunition. Give the best gun a bad cartridge, and it will fail, and will prove inferior to another not really so good.

Mr. Martini used unifire cartridges with his gun, which burst repeatedly near the rim, giving bad shooting results, and causing difficulty in extraction, and thus the arm appeared in an unfavourable light.

The committee recorded their opinion, that none of the arms were perfect systems, but reported favourably of the Henry as a breech-loader, and awarded the first prize for ammunition to Mr. Daw, whose alone, of all produced, was considered to fulfil the prescribed conditions.

The Government cartridge (Boxer) had in the foregoing trial proved superior to all, but it had not been permitted to compete for the prize.

The Government was not satisfied with the results of their labors, as reported by Colonel Fletcher's Committee. No gun was as yet forthcoming, which reached the required standard of excellence. Further experiments and inquiries were considered necessary, and in conducting them, it was determined to separate the question of shooting, which was a matter of ammunition, rifling and barrel, from that of loading, which was a matter of breech mechanism.

The question of accuracy is independent of that of facility of loading; the character of the fire of a rifle is so distinct from its rapidity, that it demands separate investigation.

In March 1868 a circular was sent to the leading gunmakers, inviting their co-operation to solve the important problem, and requesting them to furnish barrels rifled on their respective systems, under certain conditions, which were as follows:—The bore to be .45 of an inch in diameter, the bullet to weigh four hundred and eighty grains, and to be solid. The charge was to be eighty-five grains of powder. The barrel was to be thirty-five inches in length, and to weigh 4lbs. 6oz.

Beeswax was to be used as lubrication; this being the material which best withstands variations of climate.

Steel was recommended as the best material for the barrels.

The Henry breech mechanism was to be used with all these barrels and the Boxer cartridge.

Six systems of rifling* were submitted to the test, out of which the Henry came triumphant.

The Henry system of rifling is polygonal, having nine or seven sides, the latter number is now adopted, as less expensive to manufacture, and equal in other respects; each angle is broken by a rib which creates re-entering angles.

The twist is uniform, one in twenty-two.

The trajectory of this rifle was flat, so much so that throughout a

*Whitworth, Westley Richards, Lancaster, Rigby, Henry, Enfield.

range of five hundred yards, it was only eight feet one inch, and a bullet would have struck a Cavalry soldier at any part of it. While with the Snider he would be safe for two hundred sixty-two yards out of the five hundred.

The superiority of the Henry rifle in point of accuracy was marked. Its initial velocity is a hundred and ten higher than that of the Snider. It penetrated $14\frac{1}{2}$ elm planks half an inch thick, against $8\frac{1}{2}$ of a like thickness pierced by the Snider; it also penetrated through iron plates half an inch thick at two hundred yards, which the Snider failed to pierce at a hundred.

The Henry requires about half as much allowance for wind, when fired at a thousand yards as compared with the Snider.

The system of rifling is durable, for upwards of 30,000 rounds have been fired from the same arm, without any signs of deterioration.

Possessing all these advantages, the Henry system of rifling was adopted, as being most suitable in all respects for the requirements of the service.

Having thus obtained a good shooting form of barrel, the next question to determine was how it should be loaded? And in choosing a breech mechanism, rapidity of fire is not the only thing to look for; its safety, care of manipulation, non-liability to get out of order, by wear, exposure and rough usage, must be considered.

The tests applied by the committee were most searching.

The arms were carefully examined first, and then twenty rounds were fired for rapidity. Sand was thrown into the breech mechanism, both open and shut, and the rifle was again fired without cleaning except such as could be done by hand.

Damaged cartridges, to insure escape of gas, were fired in order to test the safety of the arm.

Each gun was finally put to the test of long continued firing; it was allowed to rust by exposure, at intervals, and water was occasionally poured into the breech mechanism.

Sixty-five rifles were thus experimented upon, but as the tests proceeded, many were found to fail, and finally of the whole number, there remained but ten.

These were the Bacon, Carter and Edwards, Kerr, Wilson, Birdau, Money, Martini; Henry, and two Westley Richards' rifles.

The first four guns mentioned are of the class termed "bolt guns," and have breech closing arrangements somewhat similar to those of the needle gun and the chasseur. The remaining six were of the breech block class.

The "bolt guns" were specially tested to demonstrate their liability or non-liability to accidental explosion of the cartridge, in the process of closing the breech.

Occasionally, and in spite of the greatest care, there occurs in the course of manufacture a sensitive cartridge, more so than others. Cartridges having all kinds of defects that might render them more easy to explode were supplied, for the purpose of testing the bolt guns.

But one of them stood it, the Carter and Edwards, and in this instance even, an impression remained, that a sensitive cartridge might be exploded, on this account the bolt system was rejected.

The experiments were continued with the six breech block guns that remained.

The Martini fired twenty shots in a minute and two seconds, against the Henry's twenty in one minute and seven seconds.

All the rifles stood the test of sand thrown into their breech mechanism, and all proved safe when tested with damaged cartridges. When however they were tested by exposure, four out of the six systems broke down.

The Martini and the Henry were left, and the former had as regards this last test, proved superior to the latter; its breech mechanism having been found in perfect order.

A comparison was made between the two rifles, in the points of safety, strength, number and simplicity of parts, facility of manipulation and cost.

As regards safety* and strength both weapons were equal.

The Martini mechanism was the more simple, having but twenty-seven parts against forty-nine of the Henry, it was also easier to manipulate, having no hammer.†

In the first Henry rifles produced the hammer was placed on the right side of the gun, as is usual, but complaints having been made of difficulty in catching the sights, the hammer was put on the left. This arrangement does not appear to have the desired effect.‡

A rifle was made of which the breech mechanism was that of Martini, while the barrel was rifled on the Henry system.

The weapon so constructed exhibited no falling off in point of accuracy or rapidity, and it was finally recommended by the Committee

* The Martini Henry is safer than the Snider, without the safety bolt, and as safe as the latest pattern with it.

† As compared with the Snider for simplicity and number of parts the Martini has twenty-seven against thirty-nine and is cheaper to produce.

‡ The Martini was reported cheaper to manufacture.

as the future arm of the British soldier, in their report of the 11th February 1869, and christened the "Martini Henry."

The breech mechanism consists of a breech block which works on a pin passing through the rear end.

The block is lowered by pushing the lever downwards and forwards; by this movement the spiral spring inside the breech block is compressed and the striker assumes a striking position.

The extractor is made with two arms, the falling of the breech block on its lower arm throws forward the upper by which the cartridge is extracted.

When the lever is replaced, the block is raised and the breech closed, the spiral spring being ready to give the necessary strength to the striker.

There is a safety bolt, by which, when the arm is loaded, the trigger may be locked and an indicator to show the arm is cocked, and ready to fire or that it is unloaded.

The recoil does not, as is sometimes stated, come on the breech block axis pin, but on the "shoe."

All kinds of objections have been urged against this rifle, in detail, some have gone so far as to say, that it is worthless as a military weapon.

It has been said, that the face of the breech block is convex, and that it cannot therefore properly support the base of the cartridge.

The answer is, that the face is *not* convex but flat, and that it lies true against the base of the cartridge and thoroughly supports it.

Then people said, that there was liability to explode the cartridge in the act of closing the breech, were the trigger accidentally pulled. This has been proved incorrect, and certainly, any one who has had a Martini Henry in his hand, would see it was simply an impossibility.

It was objected that the empty cartridge case was ejected into the rear rankman's face. Poor rear rank man, it is a comfort to think, that he need not be subjected to such an indignity, as the extraction can be regulated, and when it happens the consequences would not be very serious.

The rifle, having no half cock is objected to, but is it necessary to keep a cartridge in a rifle, which can be loaded almost instantaneously.

It has been said that on a dark night, one cannot see whether the rifle is loaded and that it is therefore dangerous. I think the answer to this is, that one should always consider a fire arm loaded, and treat it accordingly, this is at least a safe rule.

The most formidable attack however has been made on the spiral spring, which gives the striking power to the piston. It is uncertain, it will break, you cannot ensure its always striking with the same force, and so on.

An honorable member of the House of Commons not long ago, commenced a string of objections, by asking why the rifle should be called the Martini Henry? and he proved, to his own satisfaction at least, that the name was wrong. But to revert to the question of the spiral spring, the attack upon it was the more serious, as there seemed some ground for it.

Those who have handled the Martini Henry rifles sent for trial to this country, will remember, how in particular cases, misfires were very frequent.

Lord Elcho, whose opinion is the more valuable, that he had been a strong opponent of the rifle, spoke in its defence much to the point in the House of Commons on the 29th of April last.

With regard to the misfires charged against the arm, he stated, that whereas the original Henry Martini spring had a striking power of forty, those rifles sent to this country and elsewhere, to be experimented with and reported upon, had a striking power of only twenty-six—and that misfires have practically ceased on the substitution of stronger springs.

Then as to the uncertainty of the "pull off," he said that in 1870, twelve rifles were sent to the Wimbledom Rifle meeting, out of nine of which 3,119 rounds were fired, by seventy-seven men, inexperienced as to this particular weapon. The "pull off" was daily tested, and not the slightest variation was found in it.

To those who objected, that a stronger spring necessitated a stronger "pull off," Lord Elcho opposed the opinion of a practical mechanic, that the "pull off" could be reduced with perfect safety to 3lbs. (one half that of the Snider,) by a very slight modification of the spring, without interfering with its principle.

As regards durability, spiral springs have not hitherto failed. The Snider has three such and has not failed. Spiral springs have been long in use in the needle gun, and have been employed in the more modern chassepot.

Practice has entirely upset these theoretical objections.

It was stated that the pin on which the breech block works, would break or be strained with the explosion of the charge.

To try whether this could happen, a rifle was fitted with a leaden block pin, and fired many times. The pin was afterwards taken out easily, and found to be in perfect condition. The recoil does not come on the pin, but is taken by the iron shoe, and dispersed over a large surface.

The recoil has been considered excessive; and it must be confessed, I think, that it is greater than in the Snider. This has however been remedied, by making a slight change in the bend of the stock, which has lessened it.

Most favorable reports have been received of the rifle, from all parts where its capabilities have been tested.

190,000 rounds have been fired from eighty-six arms; an average of 2,000 rounds from each. One rifle fired 3102 rounds, in the interval between March and September without being cleaned, though exposed to the weather. Another fired 5097 rounds of ball cartridge, and 1020 blank cartridges without cleaning.

When the rifles experimented on were returned to Enfield, many were in a wretched state, showing the severe treatment they had undergone; but yet they worked freely, and the spring was the same as when put in, without a symptom of rust.

The reports from this country, whose moist, warm climate is calculated to test the durability of the weapon, and its power of resisting injury to the utmost, state that when the spiral spring had become stiff from want of oil, or the action of rust, its freedom of working was at once restored, by closing and opening the breech a few times, and that for flatness of trajectory, accuracy, simplicity of mechanism, and extreme non liability to get out of order, it was unrivalled, and that compared with it, in all these points, the Snider was a toy.

These reports have been made in favour of the first manufactured arms. Since their issue, the weapon has been materially improved.

Its weight has been reduced from 9lbs. 7oz., to 8lbs. 7oz., and at the same time, though the arm is lighter, the recoil is less.

The chamber of the rifle has been shortened, and in place of the long cartridge, a "bottle necked cartridge," as it is termed, has been introduced, which is much shorter.

The rifle is now made 2½ inches shorter than before, the same length as the present serjeant's rifle, and it is fitted with a sword bayonet. The balance of the arm has been improved, and such minor objections, as that the "back sight" was in the way, when trailing arms, and that the form of the lever prevented a good grip of the stock at the Bayonet Exercise, have been met by slight alterations. The breech block axis pin is made of gun metal.

Such is the "short actioned Martini Henry," which is to be the future weapon of our soldiery. Everything that could be done, in the way of trial, and in the way of taking scientific evidence, has been done. If this rifle is not a first rate arm after all, it will be very difficult, hereafter, to believe in any trials, experiments, or in any evidence whatever.

The chassepot rifle has been mentioned once or twice in the course of this memoir, it is, or rather was, the weapon of the French Army,

Like the needle gun, its cartridge is exploded by a needle, and there are other points of similarity between these guns. They are both bolt guns. In the chassepot the rear end of the barrel is made in the form of a slot, in which works a bolt, which is hollow. The bolt is furnished with a lever. To open the breech, the lever is turned $\frac{1}{4}$ to the left, and the bolt with the needle arrangement inside it, is drawn back, the cartridge being inserted, the bolt is pushed forward, the needle remaining stationary and the lever is turned to the right; the needle darts forward when the spiral spring which holds it is released by the action of a trigger. The chassepot is a small bore, and has a paper cartridge. The whole of the gas escape is taken by the breech, to assist in the prevention of which, an Indian rubber washer is used. Each French soldier carries a spare washer, two spare needles, and springs.

The rifle has a considerable recoil, and the gas escape after repeated firing, becomes excessive.

Such as it was, the French thought highly of it as a military weapon, and Captain Jules Simon brought two specimen arms down to Woolwich, to try with the Martini Henry.

In accuracy, the Martini Henry was far superior.

Its trajectory was lower, being at a range of 500 yards, eight feet two inches against ten feet of the chassepot.

The manipulation of the French gun was very fatiguing, and after firing ten rounds with it, the breech mechanism got clogged; the cartridge could only with great difficulty, be forced into the chamber. The Martini Henry was superior in this respect, and its rapidity of fire was more than double that of the chassepot. The former fired twenty rounds in forty-eight seconds; the latter twenty rounds in one minute and forty-two seconds.

In the event of a misfire, there is no means of extracting the cartridge, except by using the ramrod.

The weight of ninety rounds of chassepot ammunition is 6lbs. 9oz., against 9lbs. 5oz. of the Martini Henry. Ninety rounds of Snider ammunition weighs 9lbs. 3oz.

The only advantage in favour of the French weapon, is the lightness of the ammunition. This is counterbalanced by the following points in the Martini Henry.

Increased strength and safety of ammunition. Greater accuracy and longer range. Flatter trajectory. Greater penetration. Greater safety, strength and simplicity. Greater rapidity of fire.

It remains to be seen, whether with the experience of the late war

the French will retain this weapon so defective in our eyes, for the armament of their troops. We may rest satisfied, that soon our soldiers will be armed with the very best rifle, that science and mechanical skill, according to present lights, can produce; though the time may come and not so very far away perhaps in the future, when it too may become out of date, and be replaced by some simplified repeating magazine gun still more effective.

Whatever the weapon, let us remember, how necessary is an intelligent use of it. What are the constituents of an effective fire? First and foremost accuracy, 2nd, rapidity. The latter is a matter of skilled manipulation and practice, the former, involving other qualities, is the result of educated intelligence. Let us then carefully teach our soldiers at our leisure; and in time of need, experience will show (as it has already with the Prussians) that our labor has not been in vain.

III.

ON INFANTRY ATTACK UNDER FIRE WITHOUT RADICAL
CHANGE IN PRESENT FORMATIONS.

It is with much diffidence that such a question as this must necessarily be approached by any one who has never had an opportunity of practical experience under fire. Nevertheless at the present time when there seems to be a general tendency to run wild after numerous and sweeping changes, I think it behoves every one, who considers that our present formation is capable, with a few simple amplifications, of giving us all that is required and of adapting itself to the altered conditions of modern warfare, to assist in ever so small a way, by giving any suggestions which may occur to him, to further this object.

It has, in my humble opinion, been very conclusively shown by General Thesiger, in his lecture on this subject published in the Proceedings of the United Service Institution for May, that our present line formation is quite capable of being so modified as to render it, not only equal but superior, to the Prussian skirmisher-swarm attack, and many of us, I am sure, must greatly rejoice to think that our two-deep line formation for attack, which has endeared itself to our army by its victories during many generations of British soldiers, may after all be so retained without any fear of our being behind the age in military tactics.

It remains however to see what these modifications, or amplifications of our present formation should be.

In considering the whole of this question it would really seem as though one point had often lost the prominence to which it is entitled, viz., that in firing at an object, error of direction (or, laterally) is small and comparatively easily avoided, while error in elevation (or longitudinally) is great and very difficult to avoid, the difficulty being moreover still further increased if the object be advancing or retiring. It follows therefore that extending your men offers but a slight protection, compared with making their formation as *narrow a one* as possible.

The question, I think, naturally resolves itself into two parts, first, as to the formation best adapted for the attacking infantry while under *artillery fire* alone, which seems generally fixed for all practical purposes as the first 1,200 yards out of a total distance of 2,000 yards from the enemy's line of defence; and secondly, as to that to be adapted when the attack comes under the enemy's *infantry fire*, viz., the last 800 yards of the total 2000 yards.

As to the first of these, viz., the distance from 2,000 yards to 800 yards from the enemy, I maintain that General Thesiger has most conclusively shown, that the two-deep line formation has great *advantages* over the skirmishing formation, from the simple fact that the slightest error in elevation misses the narrow target offered by the two-deep formation, whereas when the formation is that of skirmishers, supports

and reserve, the chance is far greater that the fire may take effect on one or other of them, more over supports to be any support to the front skirmishing line, or a reserve to be of use as a reserve to them, can only be a certain distance from the men they are supporting; and the quicker the advance the more need for them to be close behind; so that increased accuracy of the fire which has to be encountered, cannot be met by the expedient of keeping a greater distance than heretofore between these bodies. It is here that the advantage of the two-deep line, to which we are so accustomed, is, it seems to me, indisputable.

I should however be inclined to think that allowing double-companies to advance independantly of each other, with a few paces between them (while still maintaining the general line,) would give a great gain in flexibility to the line, one of the chief arguments brought against the latter being, I believe, its too great rigidity.

As is shown in the paper I have before quoted, there would be no difficulty, when the advance, through the nature of the ground, required to be by "a succession of rushes," in effecting that object by the rapid advance of companies (or double companies, or half companies, as the case might be) in succession, each forming on the flank of the previous one. As far then as the first part of the question is concerned, the perfect capability of a two-deep line advancing under artillery fire, with at all events *no greater loss* than the skirmisher swarm formation, seems undeniable.

As to the second part of the question, viz., the advance from 800 yards distance, when the line comes within fire of the enemy's infantry, we must no doubt have skirmishers of some sort, but it does not follow that we must therefore resolve our whole line into an heterogeneous mass such as the skirmisher swarm attack. General Thesiger says, "During the last 800 yards however the advance becomes really difficult!" and "now as formerly, skirmishers must cover the front, and upon them must devolve the arduous duty of protecting and aiding the advance up to the moment when the final rush upon the position has to be made." He would have no supports or reserves, and recommends the sending out the requisite number of skirmishers from each section of a company.

I would however ask, why not on the arrival of the line within 800 yards, when the necessity for skirmishers of some sort becomes imperative, allow one of the flank half companies of each double company (say the left half companies of No. 2, No. 4, No. 6, No. 8 companies) to proceed, extending as they advance, from the centre; the line itself opening out a little to fill the gaps left in it; this would give each man a little more room which, I think, would be an advantage. It is said that "skirmishers sent forward should be in force from the beginning, as bringing forward re-inforcements occasions great loss," and I do not think that this proportion (viz., one-fourth of the battalion) would be too large. If it is so, the same can be done quite as well by advancing a flank *section* (instead of half company) from each double company (say the right sections of No. 1, No. 3, No. 5, and No. 7 companies).

The present idea being to work a good deal by double-companies, this plan would have the advantage (which is surely a great one) that the skirmishers from each double-company, would be in front of that double-company, unmixd with any other, and able to be supported, re-inforced, etc, at any time that it was necessary, from their own double-company. When the moment for "the final rush upon the position" arrived the line (or the double-company) could be re-formed in a moment. By this plan all confusion or mixing up of companies, would be at an end, as in any case double-companies would always remain intact. Moreover, it would assist the suggestion made in General Thesiger's lecture, of the "skirmishers being divided into four parts" which would undoubtedly be a system far more easy to control than the present hurried advance of alternate sections under generally inefficient commanders) for the four parts would in this case be already naturally divided, viz., the skirmishers (whether half company or section) of the four double-companies.

I have been led to make these few remarks by an earnest desire to promote, in even the smallest way, the extinction of what I believe to be the ruinous fallacy of the skirmisher swarm attack with its "order in disorder" system.

I for my part cannot see what other effect on such a formation as the latter but a repulse, with necessity to retire, or an unexpected attack by cavalry on its flank, could possibly have, than defeat and ruin, utter and irretrievable.

IV.

ARMY SIGNALLING AND TELEGRAPHY.—PAPER No. IV.

FLAGS *versus* BUGLES.

THE question as to the best means of conveying orders for the movements of small bodies of troops in the field, is still a most undecided one. How best to adapt our method to the nature of the ground, and state of the atmosphere, can alone be decided by numerous trials under every possible phase of locality and weather ; and it was to have been hoped that the system of Army Signalling, having once been introduced into the service, the authorities would never have rested satisfied with its value, until its capabilities had been most severely tested.

Such I fear has hardly been the case, for, although officers and men are still being constantly instructed throughout India, we cannot but notice that the interest once felt in the system is slowly but steadily dying out.

It is entirely our own fault. It was a long time before we adopted the system, but when we did, before we had given it a fair trial, many, in their enthusiasm, believed that, once taught, our system of inter-communication in the field would be perfection itself. Naturally they were disappointed, and as this feeling was pretty general, the interest in the subject of Army Signalling has been gradually losing ground.

But there is so much real good in the system that, it would be a thousand pities were it to fall into even partial disuse. It is not an expensive system, and can be tested daily in hundreds of different ways throughout this country ; on the regimental parade ground, at our field days, and throughout our now yearly Camps of Exercise.

It will repay investigation, and I think I may say that, any one who will devote a little time to practising the different methods of communication between detached forces in the field, will find the attempt a most interesting one and quite worthy of trial. Though it may have failed to have come quite up to the expectations formed of its capabilities, still there is no reason why it should not prove of immense value to us as a supplement to the Field Telegraph ; and if we only bear this in mind I think we shall be more inclined to appreciate the good points of the system as it is.

It was to have been hoped that sufficient opportunities would have occurred at the Camp of Exercise in the Punjab, to have enabled us to have come to some decision, or at least to have decided on some course of action worthy of consideration and trial. Unfortunately, notwithstanding the signalling arrangements were a great improvement on those at Delhi, still, we appear to be almost as much in the dark with reference to " Short Range Signalling " as we were before the late Camp was held. However, as it is very desirable that this subject should be thoroughly mooted, I would now place before the readers of this Journal the results of some experiments I myself made last year, toge-

ther with a brief account of the Signalling as it was conducted at Hussun Abdal.

The advantages of "Long Range Signalling" in a country, or under such circumstances which render it impossible to bring into play the telegraph wire, having been fully proved, we now have to consider whether we cannot obtain the same results under the same circumstances at *short* distances. Our present mode of manœuvring a regiment, or a brigade is by means of mounted officers (gallopers), or orderlies and bugles, and as long as the movements are carried out on, and confined to, a level and unbroken plain, for short distances, you cannot have a better and surer way of conveying or sending messages than by means of mounted orderlies; but directly you get into broken and hilly ground, where companies and regiments are separated by yawning ravines and rocky nullahs, over or through which a horse cannot go at all, or at the best not over a walk, we become dependent on either flags or bugles for the means of conveying orders.

Before proceeding to discuss the relative merits of these two instruments, we must entirely put aside the idea of a regimental or brigade parade ground, and must argue on the only practical supposition which is admissible, that the force you have to manœuvre is engaged in actual warfare. The first question which naturally arises is this. When two hostile forces are preparing for attack and defence, what is the great object each has in view? Surely to keep their respective movements, up to time of collision, a secret from one another, as far as possible.

Consequently any method of signalling, which prematurely betrays the presence of a body of troops, must be considered as disadvantageous.

Let us first give our attention to the subject of "Bugles," and see what is the present system under which they have been and are worked; what advantages we have gained from it, and whether either the system or the instruments are suitable for war under its new aspect. For Brigade Exercise the bugle has been, and is simply used to sound the advance and halt; and with a regiment it is confined to Skirmishing Exercise. When a regiment was extended as skirmishers, supports, and reserve, the officer commanding generally took up a central position from which he sounded his various orders.

On reference to the "Field Exercise" for 1870, we find that his calls were limited to sixteen. Now, although he could direct most of the movements of his battalion by these calls, still for three manœuvres he was dependent on his voice, or a mounted officer, for the conveyance of his orders, *viz.*, "Relieve," or "Reinforce Skirmishers," and "Change Front." Further, though he was supposed (in days gone past) to be able, not only to supervise, but also to personally direct, every individual body of his corps, still he could not order any separate body to act in any special manner, formation or direction. Whatever he sounded on the bugle, referred to the whole battalion. If the "advance

was sounded, the whole battalion, skirmishers, supports, and reserve had to advance.

Although given supreme power, he had a defective system to work on. For instance. If he thought the right skirmishers had suffered more than the others, he could not reinforce or relieve them except by word of mouth and even then, the drill book allowed for no such contingency—for, on the word “re-enforce” or “relieve,” the supports have to move forward in a body; or at least they are taught to do so. Again, although the “G s” represent right, centre and left, still there is no call for any one of the component parts of a battalion skirmishing, viz., skirmishers, supports and reserve. Now, it is very generally admitted, that the power of manœuvring a battalion, when in skirmishing order, no longer exists entirely in the hands of the officer commanding, but that Officers commanding companies at all events in the first line, are the best judges of the course of action they should individually pursue when in presence of, and in close proximity to, a hostile force.

We have but to read history to learn and know, how much our old mechanical and automatic formations and movements have succeeded over others, and how many hard fought-battles they have won for us, so we must not condemn them quite so freely, as is rather the custom now-a-days; but, on the other hand, we should recognize those parts of our system which require alteration, if not entire change, to enable us to keep pace with the progressive movements of the day, and therefore that although we may still feel that it is necessary to keep the supreme power of manœuvre in the hands of the Commanding Officer, yet we must consider that the increased independence of action entrusted to the Captains, has rendered the merits of the bugle call system of little importance in contrast with its faults. It must be remembered that bugles are only used, when a body of troops is thrown into skirmishing order. As a regiment should only be thrown into this order when in proximity of an enemy, we ought to have no occasion for bugle calls, until we arrive within such a distance as to expect a collision with the hostile force at any moment. Until we are actually under fire we naturally try to conceal our presence as much as possible from the enemy. It is needless to point out that we may be performing a flank movement, perfectly concealed by the nature of the ground, but as sure as we use bugles, we might, in a generality of cases, just as well march on the high ground, as take the trouble of creeping along out of sight, for they will betray not only our whereabouts, but also what we are doing and going to do. In proof of the above it is a noticeable fact that officers commanding bodies of men about to perform such a manœuvre will be most careful to issue the strictest injunctions that, orders are to be passed by words of mouth and no bugles used on any account. (See extra notes at end of Paper.) It was finding himself in such a position as this, and noticing the difficulty of passing orders by word of mouth, that induced the officer commanding one of the Punjab regi-

ments at Hussun Abdul to introduce a simple system of flag signalling to take the place of bugles. I shall refer to this again further on.

When we see men looking about, directly a bugle sounds, to watch what the others are doing, and notice that they seldom if ever act on them, until the word has been passed by section commanders, we may come to the conclusion that, the bugle is not the direct communication between the officer commanding the regiment and his men. If it is not, the only advantage it was ever supposed to possess over any other method of signalling orders disappears. When under fire, and a general advance of a long line has to be made for the purpose of storming a position, nothing could have a more animating and cheering effect on the men, than some stirring bugle sound which would be taken up along the whole front; but unfortunately we do not possess such a call.

I have learnt from many officers of great experience, that except in such a case as the above, bugles or signals, of any sort or kind, are of little or no practical use whatever when once under fire. We have, therefore, now to consider the point of signalling, as lying between commandants of battalions and companies, and between the latter and their section commanders, bearing in mind, that we have reason for believing that when actually in the presence of an enemy, signalling of any description, *on a small scale*, is of little value. Any system which only helps us half way through a difficulty, and can only be utilized up to a certain extent, and then falls to the ground entirely, must be looked on as defective.

Bugles may be used, as I have endeavoured to show, for passing along an extended line in action, or along a column of route, any simple and ordinary orders such as "advances," "halt," etc., but when you come to try and manœuvre a body of men by means of bugle sounds, and find that you not only have to supplement those in use by mounted officers and words of command, but that you can only move your battalion together, and again are quite unable to manœuvre any particular unit of it, except by word of mouth, you begin to feel astonished at the system having lasted so long.

We may sum up the Bugle System in a few words. It is defective, because, although intended as a means by which the commandant may manœuvre his whole battalion, yet he can only perform a series of mechanical movements, and is unable to convey orders for a certain few movements, except by word of mouth; and again, because any order he sounds on the bugle must be applicable to the whole battalion, and therefore he cannot move any particular body in a certain direction by aid of the bugle, but is dependent on his assistant mounted officers. It is complicated, as shown by the difficulty in thoroughly instructing the men in the different calls, and in containing a number of obsolete and useless calls, such as "Fire"—"Incline—Wheel"—"Alert"—"Quick"—"Double"—"Lie Down"—"Rise"—most of which are either left now to the individual intelligence of the private, or given by section and the company commanders; and finally it is faulty in the extreme in the only

position in which it comes into play. It is liable and almost certain to disclose the presence of a force whose proximity you may wish to conceal to the last moment, in order to carry out some flank movement if brought into use to conduct its manœuvres. It therefore neither answers its purpose in any one way in which it is intended it should, but it is very liable to create confusion, and prematurely betray your presence to an enemy. If we wish to perfect the bugle system we must add a number of calls, even more complicated than at present, unless we thoroughly reconstructed it by basing it on our signalling principles, when we should require a different instrument, to produce only two distinct notes, high and low, by which to produce the ordinary numeral signals. It is plain that our present calls are much too complicated, so we may dismiss the idea of increasing them with any fresh ones. There is but little doubt that at times the sound of the bugles in presence of an enemy must have a stirring effect on all, and it would therefore seem advisable to retain a few of the present ones, and those the most simple, such as the "Advance"—"Look out for Cavalry"—and "Assemble" with perhaps the "halt." To these I would add a new call for a "General advance or Charge," which should be taken up all along the line, and by the supports and reserve, I shall refer to this again.

Having so far disposed of the bugle system for the conveyance of orders; having we think shown that at the very least it is very defective; we must now turn our attention to another which might supersede, or at all events supplement it in the form in which I have just suggested it might be retained.

We know in Army Signalling, that, notwithstanding the numerous instruments, both portable and permanent, which have been invented and tried, there is but one really well suited to the requirements of our service, *viz.* "Flags." We have found that signalling can be carried on with them at any distances up to twenty miles, it all depending on the power of the glass (telescope) how far off you can read the signals. We know also that, up to two miles, a four foot flag can be read with the naked eye, and they have proved of use even at short distances of a mile in hilly country. We have now to test them as to their applicability for regimental use.

Last year in frequently drilling a wing of my late regiment (25th N. L. I.) I was constantly struck with the inefficiency of our bugle system, finding that many manœuvres which I wished to perform, I could not order except by word of mouth; and eventually for several reasons, which are becoming plainer every day, I gave up the use of the bugle almost entirely. Having paid some attention to the subject of "Army Signalling," it seemed to me that a battalion or brigade might be manœuvred by the means of flags, and with a view of testing its usefulness, I applied for, and was granted permission to teach a few of the Native officers and non-commissioned officers the elementary portion of Signalling. Wishing to test its capabilities to the utmost, I drew up the following code, by the aid of which,

every manœuvre, open or close order, in the Field Exercise can be signalled.

Signal Code for Parade and Field Manœuvres.

1. — Right.
 2. — — Centre.
 3. — — — Left.
 4. — — — — Extend.
 5. — — — — — Close.
 6. — — — Advance.
 7. — — — — Retire.
 8. — — — — Halt.
 9. — — — — Reinforce.
 10. — . — — — — Relieve.
 11. — . — — Look-out for Cavalry.
 12. — . — — Alert.
 13. — . — — — — Wheel.
 14. — . — — — — Incline.
 15. — . — — — — — Change Front.
 16. — . — — Assemble.
 17. — . — — — Double.
 18. — . — — — Column.
 19. — . — — — — Line.
 20. — . — . — — — Echelon.
- Skirmishers — — — —
- Support — — — — —
- Reserve or battalion — — — — —
- Brigade — — — —
- Division — — — — —
- Cavalry — — — — —
- Artillery — — — — —

I first taught them the numerals 1 to 0, pointing out the great yet simple difference between the dot——and the dash———. With- in a few days they had picked up the numbers up to 20, and so I then gave them the first ten orders and the three special signals, which will be seen I made as easy as possible. As the practice was quite voluntary, and carried on out of hours, it took me a trifle longer than if it had been conducted at a parade. It is sufficient to say that in a little over three weeks they were expert enough in my little code, as to warrant an attempt with them on parade. The Commanding Officer took up his position on a small hill with a signal man with a four foot flag. A non-commissioned officer with a 2½ foot flag was posted to each company. The wing was manœuvred over broken ground at distances varying from

$\frac{1}{4}$ to $\frac{3}{4}$ of a mile. The N. C. O's kept a sharp look-out and acknowledged the signals with a short wave of the flag. Every description of manœuvre was performed and portions of the wing moved without reference to the others. For instance. The C. O., supposing the enemy to be trying to turn the right flank, signalled, "Halt, Right, Support, Right Wheel, Extend." This and other movements of the sort were performed with but few mistakes. There were always a number of spare signalmen, and in moving over undulating ground, one was always left to pass on the C. O.'s orders, whenever any body of the troops were out of direct sight. Of course this was all very well for parade, but even then we found numerous disadvantages which proved more and more difficult to overcome every day. The ever changing background caused by the different positions of the moving troops, made it at times quite impossible to read the C. O.'s signals at all; then the difficulty of the company signalmen keeping their attention fixed on the Head Quarter Station, for the missing of a dot or a dash would of course alter right, left or centre and produce the most dreadful confusion. We afterwards tested the one against the other. Bugles against flags, and found the results rather in favour of the latter, for the signals could always be seen if they were being paid attention to, whereas, if the wind was at all adverse the bugle would not be heard any great distance. On one occasion it was inaudible at 600 yards. I regret the monsoon put an end to my attempts, and since then I have been unable to recommence them. From my experience of six weeks of constant practice such as above, I could not but come to the conclusion that a few very simple flag signals would be very useful, that the idea of signalling any intricate manœuvre either by flag or bugle sound, must be abandoned, but that a judicious combination of the two might be effected. In a tolerably level country, a mounted man will always be the best means of conveying orders short distances, as well the surest. In hilly ground, intersected by narrow and broken ravines, flag signals of the most simple descriptions should certainly alone be used for short distances; whilst bugles should only be used in the presence of an enemy, (It must be remembered that I am not referring to the ordinary barrack and parade calls,) and then the calls should be of the most simple but stirring description.

At the late Camp of Exercise in the Punjab, I was in hopes of seeing numerous trials, and of being able to record some really practical result, but with one exception, I noticed no attempt at endeavouring to settle this question. Although signalling with flags was carried on with some degree of success at times, in supplementing the field telegraph, still only in one regiment did they appear to have any system of working a battalion over the hills, and of keeping them in hand by any method of regimental signals.

The case I refer to was that of the 29th P. N. I. and Colonel J. J. H. Gordon, commanding the corps, has kindly placed at my disposal the following notes relating to his system, which I cannot do better than give in his own words:—"My Regimental Signalling suggested itself to me from the difficulty experienced in conveying orders by word of

" mouth, while out skirmishing and moving in detached bodies among the ravines, and on the hills near Jullalia (camp of the 3rd Infantry Division on the Chach Plain, Camp of Exercise, Punjab) in January last, and on several occasions I found it work well and safely.

" The flags used were small red, and white ones, on short sticks about $2\frac{1}{2}$ feet long, so that they could be easily carried.

" Red meant Advance.

" White meant Retire.

" Red and White together meant Halt.

" Red waved horizontally to right (like Ricochet at Musketry), meant Right Incline. White to left in the same manner,—Left Incline. A second wave meant another incline, as with the repetition on a Bugle.

" In the very deep and broken ground, (between Jullalia and Hus-sun Abdal for instance), where with great difficulty a horseman could get along, and where from many intervening positions you could see the line of skirmishers and supports, and were called upon to act with other bodies, these small flags could be seen and convey orders, when the voice could not convey them, and Bugles could only re-echo *mis-understandings*. An officer on horseback could get to a commanding point and signal to the reserve to "Advance," or to move to the right, etc.

" Of course on those occasions, a look-out was always kept towards the direction from which orders were expected, by a N. C. O. or connecting link.

" Such signals could be used in the execution of preconcerted combined movements of larger bodies, but otherwise I don't think they would do for operations beyond the regimental field.

" However, such as they are, I found them of use, simple and easily understood, and also capable of interchange.

Colonel Gordon's actual experience is clear evidence in favour of the practical working of short range signalling, when confined to a few simple orders and signs. In noticing the necessity for keeping a sharp look-out towards the point from which orders were expected, he does not mention having found any great difficulty in keeping up communication with any or all portions of his battalion, and so we have every reason to hope that, the misunderstandings, which I have pointed out as likely to occur from the missing of a dot or a dash, when using a code such as I drew up and actually worked, would not occur with a system of simple signs such as tried by Colonel Gordon; and again that, by means of connecting links, various units of a battalion may be manœuvred in conjunction with, and take part in the combined movements of, other bodies, through the medium of signals passed from the Officer Commanding the whole force.

At Hussun Abdal, during the attack on the position of Rous on the 18th of January, the inter-communication between the Officer Commanding the Force and the four columns, although mostly kept up through the medium of the Field Telegraph, was yet greatly supplemented by the means of Flag Signals ; whereas on the side of the Defence the signalling was entirely carried on by means of Flags. The four attacking columns advancing in different directions, creeping along the bottoms of deep and broken ravines, now and then working their way through narrow gullies and over breakneck ridges, were always entirely dependent for orders on the signal parties attached to them ; for a horseman could not have covered such ground much faster than, even if so quick, as a man on foot.

This was the only day during which the capabilities of short range signalling can have been said to have received any trial at all on a large scale, but except in the hills below Attock the manœuvres were generally conducted over fairly level country. The operations being entirely confined to the day time, there was no practice with night signals, although I am afraid until we have better lamps we cannot expect to have any results at all except entire failures.

Signalling was first tried during the preliminary Cavalry manœuvres, and found out of place, the movements being so rapid, that there was little or nothing to signal ; and afterwards, it was only in such positions as at Rous and the Attock Hills, where it played a supplementary part to the Field Telegraph, that Visual Signalling showed itself of real practical use under special circumstances.

It was a pity that it could not be more fully tested at the time.

As it may interest many of the readers of this and the three previous papers on this subject, I will quote the special instructions issued by Lord Napier of Magdala with reference to the system of Army Signalling at Hussun Abdal :—

“To attain success, it is absolutely necessary that the parties should be placed in pairs corresponding with one another, and should be moved, as little as possible. When moved, it should always be to points, previously fixed, such that each party may know in what direction to look out.

“It is obvious that signalling parties cannot communicate with troops on the march, nor, except under special circumstances, with any one but the party with which they correspond.

“Occasionally the nature of the ground may admit of messages being sent to one or more stations from the place in which the Commander of the force may happen to be ; but usually it will be necessary for him to send and receive messages by means of orderlies.

“On no account should the signallers be allowed to rejoin their regiments during an operation. They must be kept together as a body.

at the Head Quarters of the force they are attached to, and provided with tents, carriage, &c., independently of their regiments.

“To enable the officer in charge to locate his parties judiciously, it is necessary that the Officer Commanding should give him a general idea of his plans, so that he may at once place his parties properly, and be prepared to send them to other suitable stations, as the movements go on.”

When we compare what both officers and men have to learn now-a-days, with the trifling amount of military education required of them until within the last few years, we cannot help realizing the necessity for the utmost clearness and simplicity in every thing that we wish our soldiers to master. This is more than ordinarily necessary in the system of Army Signalling, which although, not destined, I believe, to play the important part in our future wars which it was generally supposed at first that it would still, will always be a great resource in its subordinate and supplementary position in connection with the field telegraph, as already pointed out. We may, therefore, reduce the means of inter-communication during warfare to the following three well-known systems:—

1. The Field Telegraph.
2. Flag Signalling by day and lamps by night.
3. Bugle Calls.

It is not within the province of this paper to touch upon the great and important duties required from and carried out by the first named, except to notice the strange discrepancies in the individual opinions of many of our scientific officers as to the relative merits of the arial and cable or ground lines.

The second and third call for especial attention. With reference to Flag Signalling by day and lamps by night as supplementary to and acting in conjunction with the Field Telegraph, I think it has been shown already, that one alphabet is quite sufficient, that the Code and numerals should be considered as obsolete, and that as far as we know at present the Morse alphabet is the best one we can have, as being most suited for through communication along a line where different instruments are being worked.

We next come to consider signalling on a smaller scale, *viz.* for passing words of command amongst troops, in such positions where the telegraph cannot be brought into play, and where from the formation of the ground, it would be either a work of time or almost an impossibility for a mounted man to carry orders from one point of the field to another.

I believe it will be very generally admitted, as I have already mentioned, that, where the ground will permit, under most circumstances, for the conveyance of orders, short distances, a horseman is by far the

best, and I think it has been shown that our bugle system, upon which we have so entirely depended up till now, is very defective and yet a great deal too complicated. We have a number of bugle calls which are worse than useless, because were they done away with, the men would pick up and recollect the few remaining ones much better than they do now. In the present "Field Exercise" we have (16) sixteen bugle calls for Skirmishing exercise. It would be difficult for any one to point out the use of such calls as "Extend," "Close," "Fire," "Alert," "Wheel," "Quick," "Double," "Lie down" and "Rise." Others might be included in this list, but I have only mentioned those about the uselessness of which there can be no doubt.*

I would propose for consideration that the following Bugle Calls be introduced and retained :--

1. Advance, Right, Left.
2. Halt.
3. Cease Firing.
4. Assemble.
5. Look out for Cavalry.
6. General Advance or "Pas de Charge."

In preference to sounding one G for right and two for left, I should feel inclined to think it better to sound a continual number of high Gs if the movement was to be made to the right; and a number of low ones if the movement was to be to the left, as a single note is so liable to be missed as a single sign in signalling, whereas the high and low notes continuously sounded would be easily recognizable.

It may appear strange that I have proposed retaining the "Cease Firing" whilst expunging the "Fire," so I would explain that the "Cease Firing" only be used either as a sign of "suspended hostilities" for a truce, or perhaps in such rare cases, where a sudden charge might be made by one's own cavalry across the line of fire of an advancing or halted friendly force; not otherwise, for it is clearly plain that the officers commanding companies must be the best judge of such points as these.

With reference to the others, both retained and expunged, I would leave them to speak for themselves. Any one who has heard the Cavalry trumpet call for "Charge,"† and noticed its effect would, I think, advocate the introduction of a similar one for the Infantry, and having the command to charge, it seems strange there should be no call. So

* Since writing this paper I have read with pleasure Captain Adam on "Modern Infantry Tactics" in which he proposes, (page 103, No. 10), to reduce the bugle calls to six.

† The Prussians beat the "Slower March" on the drums, vide Major Schmid's Paper, Journal No. 12.

far as regards bugles, we have now to consider what method is best suited to take their place under such circumstances, as when "calls" on them would only result in misunderstandings or could not be brought into play. The "Flag" is undoubtedly the best instrument we possess for this purpose. Simple and good as are the signs introduced and worked by Colonel Gordon, I should be departing from the strict rule of simplicity, which I have endeavoured to show is so absolutely necessary, if I was to agree that they were the best we could have. Premising that the Morse Alphabet will be retained, I would suggest that we should make use of the most simple signs in it to represent the foregoing signals; and in order that we should not have too many men interfering with the same work, I would further propose that the buglers, having now so little to learn—saying the 16 bugle calls were reduced to 6, should be instructed in the Morse Alphabet, carry a flag each and conduct the signalling with their own companies. The simplest signs in the Morse are the four dots, and three dashes, to which I have added another consisting of four dashes* to complete the following little code.

— E	...	...	... Right.
— — I	...	...	... Left.
— — — S	...	...	... Advance.
— — — — H	...	...	... Halt.
— — — — T	...	...	... Assemble.
— — — — — M	...	...	... Alert or Look out for Cavalry.
— — — — — O	...	...	... General Advrnce.
* — — — — —	...	...	... Cease Foring.

E or I by themselves would mean an incline to the right or left, and if continuously repeated an entire turn in that direction. E or I would warn you to expect an attack in that direction.

It would only be by continual practice and by the employment of sharp men that any system of signalling can be kept up, but I believe from the little experience that I have had, that with some such a little code as worked by Colonel Gordon or as proposed above, a regiment might be manœuvred over difficult ground without any difficulty. If one of the buglers did not see with certainty what the Head Quarters signal was, he could have it repeated by giving the "not understood." Again, should the Commanding Officer wish to send a message to any particular officer, he could do so at once by the aid of the Morse, first signalling the name. There would not likely be any confusion arising from doing so, because the company signal men would at once know that the manœuvre code was not being used, at all events after a few letters. I would take this opportunity, in referring to the Cypher system of noticing Captain Begbie's very valuable paper on cryptography, published in Journal No. 9 of 1872, and written in reply to my first paper on the cryptograph, which appeared in No. 6 last year.

As it must have been seen, my sole desire was to court discussion, by making a proposition for a new system, hoping thereby if possible to

help to simplify a most confusing and complicated cypher system as at present in use, and I am extremely glad that such an able exponent as Captain Begbie undertook to reply to my ideas on the subject.

Valuable as is his Paper, with a greater part of which I entirely agree, I cannot help feeling that Captain Begbie has argued rather too strongly against the system, as intimately connected with the instrument proposed by me, than against the system itself, notwithstanding that he says that he deals only with it and not with the instrument.

However, so convinced am I of the necessity of rapidity of action, and clearness and simplicity of manipulation, that I have lately been employed in making a new Cryptograph, with which my first proposed system can be retained, and which my readers may remember consisted in doing away with the necessity of a key word.

I have every reason to think that even should the instrument, *in its perfect state*, which is very unlikely, fall into the hands of an enemy, they would be unable to make any use of it without a knowledge of the simple system by which it is worked ; which consists in having no key word, and yet the message can be signalled in cypher and read as a true one with the greatest ease, thereby doing away with trouble and the danger of writing them out in a book, which would be a fearful tell tale if it fell into the enemy's hands.

If it is to become of any real practical use to the service, it would be premature to enter into any further details of its construction or working in the pages of this journal, so I would merely state that I am sending it to England for the opinion of those more capable of judging of its merits—I refer to the staff of the Signalling Department at Chatham—and for trial should they consider it worthy of such.

It is only by such endeavours, as I have from time to time noticed, that we shall advance step by step towards thoroughly simplifying the numerous new duties which our soldiers are required to master year by year.

In conclusion we must bear in mind that it is very probable we shall find, the more we test the usefulness of visual signalling, the more we shall find its supposed great advantages decreasing. We are too apt to treat subjects at first theoretically, instead of practically ; and we are constantly finding ourselves extremely disappointed with the results of the second as compared with those we had formed on the first. How often have innovations been introduced under the most auspicious circumstances ; innovations which were to have revolutionized our old system ; and yet how often, after the first burst of energy and excitement, we have found ourselves subsiding into the old groove. Notice the present re-actionary feeling with reference to our drill, and we have found but little difference ; may be the old groove has been reconstructed of some better and more durable materials, and we glide along it more easily and find fewer obstacles in the way, and those more easily overcome.

So it is with signalling. It is nothing but one of the most ancient customs revived in a slightly improved form.

Even in the cypher system there is nothing new, except the instrument used (the Cryptograph) and as yet we have no cause to be proud of our mechanical application of it.

We, all of us were too much inclined to believe that Signalling was destined to be of the same importance to us as Telegraphy; and it is but slowly we are beginning to open our eyes to the fact that whenever we can bring the latter into play, the former must be contented to hold a very subordinate position. In signalling, as with other systems, we must be prepared to make use of it, when a favourable opportunity occurs. We must view it in the light of a most valuable resource to fall back on when the Telegraph fails us. In other words, we must not feel disappointed with present results; but continue our instruction and experiments and remain confident that some day or other we may turn the tide of battle in our favour, by the help of a thoroughly organized system of Signalling arrangements.

Let us not fling it aside, because it has not come quite up to the ideal we had formed of its value, or we may some day feel the want of it at a critical moment, as the Prussians did at Konniggratz, when, as is well known at one time of the day victory hung in the balance, owing to the want of proper communications between the two armies.

The system of Army Signalling is a most valuable one, and it is only a pity that it is not more practised, both on the regimental, as well as Brigade and Division field days. The soldier, whether officer, non-commissioned officer, or private, once having passed the course seldom or ever sees a flag again. If it is to be of use to us, we must have some annual practice, such as we have of our "setting up drill," "musketry instruction," etc, but of course on a smaller scale.

A simple system of signalling is essentially a portion of every soldier's instruction, and we shall act with greater confidence if we feel that when the opportunity occurs we shall be in a position to reap the advantage of having supplemented our military organizations with such a very important branch of it as that of Army Signalling.

R. HENNELL, *Captain,*
Bombay Sappers and Miners.

KIRKEE, JULY 1873.

EXTRA NOTE.

Since writing the foregoing paper in the early part of the year, I have noticed that the subject of Army Signalling has slightly revived, and as there have been some few orders published, which contain statements and instructions which appear to bear me out in, and

support, many of the suggestions, I have made from time to time in my different papers, I have thought it advisable to append the following notes.

The first is an extract from a highly instructive circular containing orders for the working of "dismounted" Cavalry in the field. I would draw attention to the instructions regarding the use of the "Trumpet."

TO ACCOMPANY G. O. 33 OF 1873.

SECTION XXII.

Dismounted Service.

The following extracts taken from the above G. O. appearing to bear me out in my arguments against the usefulness of the present bugle system, I have thought it right to append them to this my concluding paper.

EXTRACT.

Instructions.

Para. 11.—The commanding officer then, by word of command, without trumpet sound, directs the squadron or wing leader where to post his men.

Trumpet sounds should never, if it can be avoided, be used except to recall or mount the dismounted men.

Para. 13.—When dismounted, the men will be directed quickly and quietly, where to post themselves, centre, right or left (as the case may be), "march" or "double" being given by word of command.

Para. 14.—It is often difficult, from the distance and noise of firing, for officers or men to hear trumpet sounds. The officers should, therefore, watch the Commanding Officer, who can in many instances by pointing his sword in the direction required, indicate the flank to which he wishes them to move.

In the last Journal of the Institution, Mr. Mance in his notes on the "Morse Code" has done me the honor of referring to my Papers on "Army Signalling," and also of supporting the main suggestion contained in them; but as a false impression may be created by his introduction, I should like to say a few words with reference to it, before finally dismissing the subject of our system of Service Signalling. Mr. Mance says "Captain Hennell has evidently taken some signals, from the old double needle alphabet, which have long since been obsolete in the telegraphic world;" and then proceeds to give the "Morse Code" as at present in use over all Government telegraph lines.

Before speaking of the merits of this particular "Code," I must point out that, all the tables given in my first three Papers, with the exception, of course, of those suggested by me, are taken from the only authorized books on the system, and that Mr. Mance's Code is not, nor ever has been used in Army Signalling that I am aware of; and,

therefore none of the signals quoted by me must be considered as obsolete, until declared to be so by authority, much as every one might wish to know that they were. I might have quoted several other alphabets and codes for use, with the single and double needle instruments, but I purposely avoided discussing any system which appeared inapplicable to Army use.

Mr. Mance's "Morse Code" differs but little from the one which I have suggested, in the above Paper, should be alone retained.

It will be noticed that in the former the figures are represented by new and rather complicated signs, whereas, I suggested that the old and very simple signs, which no one could forget, should be retained; and when numbers had to be signalled, a numeral sign should be first sent and then the following would be read as figures and not as letters; but at the same time I pointed out that it was very doubtful whether it was not better to spell all numbers, which would reduce the signals necessary to be learnt by ten—a matter of great moment to a soldier who has but little or no practice from year's end to year's end.

Still, as it has been found necessary to retain a Code Book for the use of the Navy—all the apparatus, except the old "signalling pendants" having failed to work satisfactorily on boardship, it may be better to retain the numerals, although I do not see why a Code book, drawn up by means of letters instead of figures, should not be introduced.

I think it is also plain, that useful, and perhaps absolutely necessary as the signs for "punctuation" and "fractions" may be with the telegraph, they would be out of place in a message signalled with visual apparatus; and, further, no one, except experts, should attempt signalling the "abbreviated figures or words."

Notwithstanding, the "Morse Code," as given by Mr. Mance was drawn up for the use of telegraphic signalmen, whose sole work it is to signal its signs, still I think it would be a very good move if it was introduced, in combination with a *lettered* Code Book, for the Army and Navy in general.

We should then have attained "uniformity and simplicity," without which our signalling system can never give us good results.

The "uniformity" would allow a message to be despatched, for instance, from a ship of war to a military station, and passed on and received by military and civil signalmen without interruption. It would also allow of the "Cypher system" being more thoroughly worked out.

In conclusion, I feel sure that, all who take an interest in "Army Signalling" would be glad to hear, that the "Morse Telegraph Code" had been decided on for all signalling purposes, under the authority of Government; and all other codes, alphabets, numerals, etc. had been declared obsolete.

R. H.

V. INFANTRY TACTICS.

PLANS OF FRONTAL ATTACK ON A POSITION PROPOSED,

*A Lecture delivered at the Branch U. S. Institution of India at Agra,
on the 17th November 1873.*

BY CAPTAIN J. C. FIFE, 65TH REGIMENT.

MAJOR GENERAL SIR HENRY NORMAN, IN THE CHAIR.

SECTION I.

INTRODUCTION.

It is with much diffidence, gentlemen, that I rise to address you on this subject, seeing as I do some officers now present whose personal experience in warfare has been so great.

We will first consider the proposed plan of frontal attack over open ground on an enemy in position: afterwards modifications rendered necessary by other varieties of ground and cover, also the formation of troops in pursuit. We will then similarly consider frontal defensive tactics; and in conclusion shock tactics.

In order to economise time and space, we will not here discuss the relative part that frontal and flank attacks now play in war; but assuming as unquestionable that the necessity for the former still exists, proceed at once to consider the proposed plan of making them. But it will be borne in mind that, whatever the system adopted may be, it can only succeed in making the best of a very difficult operation, if the attack is made on well-trained troops armed with the breech-loader. Nor will we for the same reason advert to the formation and distribution of troops in second line, who will, we may state generally, now as ever accommodate themselves to the ground and circumstances of the case, we will consider only the attack of a battalion in first line or acting alone.

What we should aim at is a plan, which, as far as possible avoids throwing aside our traditional formations, and the great risk of an experiment; but which suits our former customs to the altered conditions of warfare, so that if found practicable we may retain them at any rate in a modified form.

At the same time we must anticipate the contingency of the Skirmisher Swarm being found alone possible on the battle field, by adopting a plan of attack capable of being rapidly and easily changed to it. We must also thoroughly train our troops to the Skirmisher Swarm system, as it was the only formation used successfully during the last war, where breech-loader met breech-loader, as well as to any plans we may select and propose to submit to the rough test of battle.

It was proved by the war of 1870-71 that the Skirmisher Swarm formation has the fault peculiar to skirmishers of want of stability (*vide* for instance, "The frontal attack of Infantry," translated from the German by Colonel Edward Newdigate.) If men are extended they are infinitely more helpless to meet a sudden flank attack, because less in hand and capable of manœuvring against it, and as we have just seen the moral effect alone on them would be more disastrous.

We should endeavour to combine the advantages of both systems of attack and avoid the defects. To retain the moral and physical force of closed masses while the enemy's fire is drawn and kept down by strong bodies of skirmishers favorably posted.

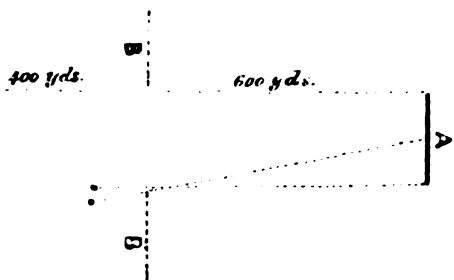
It was shown by the war of 1870-71, that the tendency on the part of the men was themselves to extend from a close formation when under heavy fire; this was partly to obtain room for the freer use of the rifle, or when as a support close behind a line of skirmishers they found themselves struck by the bullets aimed at the latter; but as a matter of reason they did not by so doing diminish their risk; for, provided as we have assumed the enemy's fire is only directed on the skirmishers; the chance of any man of the support being hit is not greater, whether he has another man or an interval next to him, provided he lies down or keeps equally under cover in both cases. We must anticipate the tendency and provide for in order to check it. We should I think move in single rank when under fire, and allow more room to each man in line to enable him freely to use his rifle and get up, lie down, and take cover with greater facility; and we should impress on the men that if a support is struck by fire aimed at a line of skirmishers in front its extension will not increase its security. At least under a heavy fire at a short range the men should stoop down when rushing to the front, they can easily thus diminish by one-third the height of the target they present to the enemy; thus avoiding more than one-third of the risk as most fire is high. It is doubtless much more in keeping with the character of a soldier to march proudly over a battle field in line as formerly, than to go through the perpetual seeking of cover imposed by the conditions of present warfare; but in adopting the latter plan a man must remember that he only stoops to conquer, and that when the time comes he is as prepared as ever to sacrifice himself as a bid for success.

SECTION II.

PROPOSED PLAN OF FRONTAL ATTACK OF INFANTRY OVER OPEN GROUND ON AN ENEMY IN POSITION.

My plan may be briefly stated to be, strong bodies of skirmishers in echelon to, and followed by, deployed lines in single rank moving without the former stiffness of the line formation.

We will now consider two proposed arrangements by which the above conditions are fulfilled.



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C—

Fig. 1

A. Position attacked.

B. Skirmishers.

C. Attacking line.

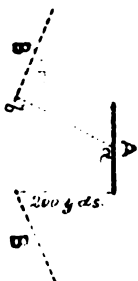
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A—

B

B

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Fig. 2



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C—

Fig. 3

Fig. 4

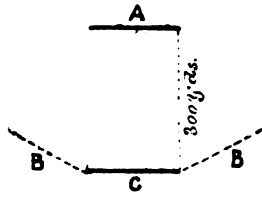


Fig. 5

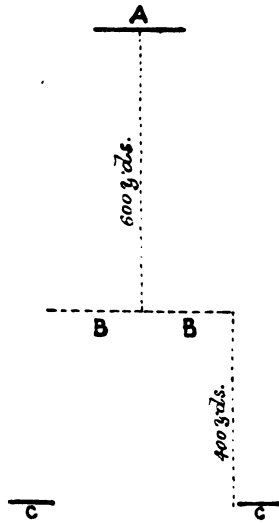
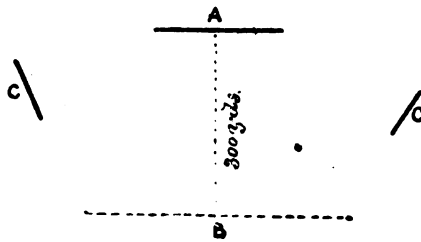


Fig. 6



A. Position attacked. B. Skirmishers. C. Attacking line, single rank

Suppose that Infantry posted behind a wall over which it can fire conveniently, are to be attacked in front by a battalion, say of eight companies, over open ground.

At 1000 yards from the position the four inner companies form single rank, and the four flank companies making a half turn outwards till clear of the single rank line, extend from the two inner flanks (Fig. I.)

Experience tells us that the loss on reinforcing skirmishers is great, but that the addition of even a few men to the skirmishing line is sufficient to give it a forward impetus: it may therefore perhaps be advisable to keep back one section of each of the skirmishing companies when the latter first extend, and these sections could be sent forward to reinforce their own companies as occasion might require.

When the extension is completed, the skirmishers advance by rushes of half companies or sections twenty or thirty yards at a time, the inner part of inner companies moving first so as to maintain the proper direction and interval.

Trial on the parade ground would soon shew whether sections or half companies should make the rushes, and the length of the latter at the different distances, for they must evidently be shorter the nearer the position is approached, and in the plan shown by Fig. I should never be so long that the inner section of the inner company of skirmishers when in front prevents the outer part of the outer company from covering their rush forward by its fire. Short rushes have also the advantage of allowing the enemy little or no time to aim.

To move when under a heavy fire by rushes of successive fractions is, I think, now pretty generally acknowledged to be necessary.

The skirmishers would require practice to enable them to advance well, keeping the direction and interval, and until they reach the 300 yards position firing obliquely. But in the war of 1870 a tendency on the part of the skirmishers to edge away from their centre, which was most heavily fired upon towards the flanks was observed; in doing this they necessarily fired obliquely.

This would, I submit, neutralise the natural inclination of the skirmishers to close the gap in front of the line, by advancing in the direction in which they are firing.

The former tendency actually observed then, and which we may confidently reckon upon, would cause them to keep the right direction.

It would not exist on the parade ground, however, where there are no effects from fire, and the movement would therefore comparatively speaking be executed more naturally and easily in actual warfare than at drill.

The four inner companies follow about 400 yards behind, and move by rushes of alternate companies, taking cover or lying down when sta-

tionary, as also do the skirmishers. One of the centre companies is always first to move : for the centre could not direct if in rear. (Fig. 2.)

There should be an interval of a few paces between sections of the skirmishers and companies of the line, to diminish the chance of their flanks firing into one another, and to allow greater freedom of movement.

Those sections which are in front cover by their fire the forward rush of the rest to join them, and the rush of the inner part of the inner company of each body of skirmishers is covered by the fire of the outer company. Trial on parade would practically demonstrate what arrangement of these details is most likely to prove serviceable in war.

The skirmishers should distribute their fire equally on all parts of the enemy's line, being especially careful to give the centre its share. In the latter respect they will be assisted by the tendency which always exists to fire most at the centre of an opposing line. They approach and establish themselves on the best available ground at 200 or 300 yards from the enemy, with their inner flanks a little drawn back, so as to distribute the fire the more equally on the position, for men habitually face and fire direct to the front of their general line. (Fig. 3.)

The fire having before been moderate, now becomes as rapid as is consistent with careful delivery, and under cover of this the companies in single rank advance and fill up the gap between the skirmishers, opening a heavy fire as they reach this position, (Fig. 4.)

After the skirmishers take position 300 yards from the enemy, the line moving as explained, would take some little time to pass over the intervening 400 yards, and join them ; and it could be kept longer back if sufficient effect had not then been produced by the skirmisher's fire.

At the 300 yards' position a pause is made to allow the combined fire of the line and skirmishers to tell on the enemy, and prepare the way for a further advance.

If his front line is only occupied by the skirmishers the charge will be made in single rank. The companies having fixed bayonets alternately rush forward as above described, and when the line is complete at 150 yards from the enemy, all rise at once and charge together with a cheer.

If the enemy's line is occupied two deep, he should be charged by a two deep line, which might be formed as follows. To prevent accidents only those of the skirmishers who are front rank men, fix bayonets before rising at the 300 yards' position. As each company approaches the 150 yards' position, its rear rank men fall behind and all close on their inner flank, and as they lie down the rear rank fixes bayonets, and once all are together the charge is immediately made.

The two centre companies, having closed on their inner files, are contiguous, but there will be an interval equal to the front of a company,

say twenty yards, between the outer and inner ones : this can be remedied by the former moving obliquely when joining the latter at the 150 yards' position. The skirmishers will move on the flanks of the line to this position, to cover by their fire the first part of the charge.

If there appears however to be the probability of a counter flank attack, one or both companies of the skirmishers on the threatened flank can be left behind at the 300 yards' position, to act as supports and be prepared to oppose it ; or if the battalion is acting alone, or it is deemed necessary from any cause, one or more of the closed companies may be left behind as a reserve at any stage of the advance those in front maintaining the interval thus formed.

As the line charges home the skirmishers are collected to form supports, and are at once resupplied with ammunition brought up for this especial purpose. It would be well to let these supports remain in rear and just clear of the flanks, where they would suffer less from the enemy's fire on the line, and be well posted to make or repel a flank attack.

Next, let us consider an arrangement where there is one body of skirmishers (Fig. 5), and half the deployed line following in echelon to each flank.

The mode of advance remains the same. We have at first then as before, a strong body of skirmishers advancing by degrees, and establishing themselves within easy range of the enemy, and covering by a heavy fire the approach of the companies in line. Next we see the two strong flanks favorably posted for striking decisively, by a convergent attack on the enemy's extremities, supported by the skirmisher's fire and pivoting on a weaker centre which is however safe owing to being refused, to the great retaining power of small bodies armed with the breech-loader and to the terrible semi-circle of fire in which the enemy must expose himself, to make a counter attack on it at close quarters (Fig. 6).

If I mistake not, we will in future see this principle of the reinforced flanks and weak centre very generally applied to all bodies of troops in action, large or small ; and whether on the defensive or offensive ; it must be the same in both the latter cases, if it holds good for one of them, as where one side will probably attack in force the other must there be similarly prepared to oppose him.

In this last arrangement the skirmishers would find their advance as a movement easier, especially on parade, where there is no tendency to edge off towards the flanks, since the enemy is directly in their front ; but they would be deprived of the advantage of bringing to bear on him a distracting fire from two directions as in the first plan mentioned.

If the object of the attacking battalion is to strike the enemy's centre, as for instance, if separate bodies have been detached to attack one or both flanks, the first arrangement mentioned would be most appropriate ; but if the flanks are to be overwhelmed by the battalion itself, the latter would probably be chosen.

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The ground and circumstances of the case must decide the matter.

We see therefore that the speciality of the system I propose for the frontal attack of a position is : that the skirmishers should no longer be so placed as to draw down the enemy's fire on the troops behind them, and which they are supposed to be protecting, but should divert it to another direction : and this is effected by placing them in echelon to the line

SECTION III.

ADVANTAGES OF THE PLAN DISCUSSED.

Recapitulation.

The chief advantages claimed for the plan are, that the direction given to all the fire of the defence at the skirmishers, renders it incapable of injuring the line.

From first to last in no direction is more than a single line or man exposed to the direct fire of the position ; this is even considering the skirmishers as a line ; thus the greatest disadvantage of other systems is removed, for most fire, Major Tellenbuch says, as much as three-fourths is unaimed and being too high passes over the first line of skirmishers, and together with the rest of the fire which has missed them, has a terrible effect on troops behind, who are forced to remain inactive. In the war of 1870 the supports when close behind the skirmishers, and suffering severely, often extended of their own accord, and then could not be restrained from prematurely joining the skirmishing line. It is the most severe trial to troops to suffer loss when unable to reply. The fire being diverted from the position of the line, it will be more possible to retain this formation than in other systems.

The line being retained throughout, or to the last moment possible, the troops composing it remain infinitely more in hand and the expenditure of ammunition under control, than if the Skirmisher Swarm had been adopted from the first. If it is found on the battle field, as I submit is improbable however, that a single rank line moving as explained and properly covered, cannot advance under the fire of well-trained troops armed with the breech-loader it can be rapidly changed at any moment and without risk of confusion to the Skirmisher Swarm formation. by extending more companies in the open space in their front, and under cover of the fire of the skirmishers sent out at first ; the remaining companies then act as supports ; and thus we also see that no mixing up, on the same ground, of men of different companies or regiments is consequent to reinforcement, or to complete change to the Skirmisher Swarm formation, as it is in the swarm and other systems. This advantage is gained without attempting to close the men already extended to one side, to make room, an operation which experience has proved to be impracticable under heavy fire.

It is attempted to retain, as far as may be practicable and in a modified form, the line system of attack—"the armour that we have proved."—and surely this must be advisable on account of its long and great popularity, the avoidance of the risk of a sudden and total change in our tactics, and the great moral advantages gained by the employment of a closed formation; at the same time a formidable skirmishers' fire, the moving of all parts of the attack with the minimum of exposure, and other requirements of the altered conditions of battle are provided for.

Until the line reaches the skirmishers in position at 200 or 300 yards from the enemy, it is practically the support, on its passing forward to the charge, one or more of the four skirmishing companies may be left behind as supports. The exertions therefore of every available man are employed to gain the victory, and the charge is made by fresh troops covered by a heavy converging fire from the flanks.

The skirmishers are thrown out strong at first, and the loss which always takes place during reinforcement, as shown by the war of 1870, is avoided; still a few men are retained to give the line a forward impetus by reinforcing when required.

Owing to the defensive power of the breech-loader, the skirmishers are themselves strong against attack, and the line can consequently be kept well back out of fire and notice, till the enemy's attention becomes engrossed in the fight with the skirmishers at a short range who will draw the fire as well as keep it down. To say that because it may be the proper course for the defenders to cease firing on the skirmishers, and pay that attention to the line only, as it approaches the 300 yards' position, and that therefore it would be done; would be as delusive as to argue that because it is the manifest advantage to the personal safety of each man in battle to put as many of the enemy as possible *hors de combat*, that therefore there never was or will be any unaimed fire, while in point of fact it is estimated at three-fourths of all that is delivered.

Their attention, arrested by the fire and smoke and galled by the effects of the skirmishers' fire, the defenders would reply to them alone, till the line, advancing as we have described and without firing, reaches the 300 yards' position and joins in the fight.

But if the line should be fired upon to any considerable extent, a little previous to this it may, if deemed advisable, be permitted to reply.

The inner flanks of the two bodies of skirmishers in the first arrangement we mentioned are strong; for though the intermediate ground is not occupied, it is directly in front of the line, and the approach is defended by their cross fire.

The position of the skirmishing bodies in the first arrangement brings a cross and slightly enfilading fire to bear on the enemy at the

short ranges. In both plans the skirmishers, together with the line at the 300 yards' position (Figs. 4 and 6) would give a terrible converging fire.

The second arrangement is powerful for flank attack.

After passing the 300 yards' position, the skirmishers' fire is not stopped, as in the old system, by the advance of the line over them, but covers the first part of the charge.

In support of my opinion of the value of the latter result I will only remark that Major General Thesiger recommended in his recent lecture on Tactics that the two flank companies should be told off for this purpose when the charge is about to take place. It will be observed that by my plan the flanking parties find themselves already properly placed to perform this duty, and it is not necessary therefore to detach them under a fire at a short range.

I may add here that I feel happy to be able from conviction to follow the example of General Thesiger in advocating the retention of the line with modifications of movement, though I have gone further in the direction of change by recommending single rank and above all the echelon position of the skirmishers to the line where practicable.

Let us now return to the discussion of the advantages of the plan :

The moral effect to both sides though in opposite directions, of bringing up closed troops at the decisive part of the fight, namely, when it has been maintained by the four companies of skirmishers for some time at the 300 yards' position is gained.

It would scarcely now be maintained that a two deep line could as formerly advance upright under a heavy fire at close quarters ; but in a single rank line men can lie down, take aim easily, and only one man is injured by the same bullet. In single rank the men can all fire when lying down ; this the rear rank men of a two deep line could not do without great risk of injuring the front rank, especially when disordered by the rushes, during which, however, they would probably push themselves into the front rank, to be able to fire, necessarily causing great crowding and confusion, especially as the lateral space is limited as in the first arrangement mentioned. The formation of two deep from single rank is however provided for, to be used if required for the charge.

The difficulty is then to bring the line to close quarters ; and I hope that it may be thought that the method I have proposed gives the best chance of succeeding in doing so. It will be considered that for the sake of better demonstration, we have assumed the ground over which the attack is made to be perfectly open and level, but it would be a rare case indeed if there were no accident in its configuration, or cover, such as standing crops, a hedge, &c., to assist the assailant.

Let us briefly recapitulate the advantages.

1. In whichever direction the enemy fires, he has only one line or man to aim at, this considers the skirmishers as a line.

2. The enemy's fire is drawn by the skirmishers who can best take cover against it, and use their weapons to silence it, for which latter purpose they are made strong.

3. The plan is simple.

4. Mixing up of men of different companies and regiments is entirely avoided, and thus control during the fight and reforming is greatly facilitated.

5. As far as possible the popular line formation is retained, and the risk of an experiment reduced, at the same time the altered conditions of battle are provided for.

6. The fire being diverted from the line, the latter can be retained at any rate longer than in the other systems.

7. A rapid and easy change can be made at any moment to the skirmisher swarm formation.

8. Even if eventually extended the men will be much more in hand and expenditure of ammunition under control, than if they had done so at first.

9. The efforts of every available man are employed to decide the issue, and the whole are combined at the decisive moment.

10. The change is made by fresh troops covered by a cross and oblique fire, or powerful flanks strike the enemy while he is held in check by a weaker and refused centre.

11. The moral force of closed troops is employed throughout, and they remain in hand to oppose a flank attack.

12. The skirmishers being strong, the line can be kept out of fire and notice till the enemy become engrossed in the conflict with the skirmishers, at the 300 yards' position, and considerably shaken by its effects.

13. The fire of the skirmishers is not stopped by the arrival of the line at the 300 yards' position, and a terrible converging fire is the result.

14. When the centre companies rush forward again from this position, their movement is covered by the fire of the skirmishers and flank companies, and it is at the short ranges that it is of the highest importance that the rush of the fractions first moving should be thus protected.

15. The closed troops are brought up with the minimum exposure to fire, and the plan is adapted for the contingency of its being

necessary to charge home on an enemy in line, which if the latter is in skirmisher swarm should, I think, ensure his defeat.

SECTION IV.

Modifications rendered necessary by other varieties of ground and cover. Formation of Troops in pursuit.

The dispositions proposed for the frontal attack of a position are capable of modification to suit various circumstances of ground and cover, &c., but the system remains the same, consisting as it does not of a rigid arrangement of the various parts but of certain fixed principles, the chief of which are :

1. To expose in no direction more than one man to fire if possible.
2. The skirmishers to draw the fire from the closed troops being sufficiently strong to effectively cover the advance of the latter.
3. The moral and physical force of closed troops to be employed.
4. The formation to suit the ground and favor the greatest effect being produced by the attack. Thus, if the lateral space is limited by the configuration of the ground or other causes, the bodies of skirmishers can keep less than the battalion interval, and the advantages of the plan would then be diminished only and not entirely lost; or if the ground suits the arrangement, room may be made by keeping back from the first one or more of the closed companies under cover as a reserve.

If there is a good position for skirmishers in front of one flank of a position, it might be occupied and only one body of skirmishers used. The attack would then probably be made in echelon from that flank covered by the fire of this body, thus the part most severely shaken by fire because nearest to it would be attacked first. If the lateral space is so limited that a body of skirmishers of the necessary strength will occupy the entire breadth, the single rank line should be divided and placed in rear of the flanks, as the enemy will, it is known by experience, fire principally on the centre of the attacking line of skirmishers.

If the enemy's position is an extended one, several contiguous attacks can be simultaneously made on it, these would be arranged to suit the configuration of the line of defence.

At the 200 or 300 yards' position the inner flanks of the skirmishing bodies should not be more than about 350 yards from the centre of that portion of the enemy's position which is attacked (the distance Figure 3,) otherwise the centre would be too distant to be as seriously shaken, its attention engrossed, and fire drawn as is necessary.

In some cases, such for instance, as if the attack had to pass over ground not quite clear of cover, where it is possible, an ambush might surprise the inner flanks of the bodies of skirmishers, and then retreat

before compromised with the line, whose view of them at the moment we will suppose to be impeded, it may be advisable to connect the two bodies of skirmishers by one of them extending a section inwards to divide the distance and act as scouts. This section should not fire but attract as little attention to the centre and be withdrawn as soon as possible.

This arrangement might also be made if the battalion is passing over undulating or slightly covered ground, to assist the bodies of skirmishers in keeping the right direction and interval.

Almost without exception however a position will be chosen by the defenders with open ground to fire over in front of it.

For fighting in thick cover, such as woods, &c., the formation is not suitable as in the first arrangement, the weakly guarded interval between the bodies of skirmishers might be surprised, and the latter attacked in front and flank simultaneously. Also in a wood the line would dissolve into a skirmisher swarm, and until it did so would be at a great disadvantage, presenting a large target, while the latter is completely under cover and moves with much greater facility.

In a pursuit, where the distance passed over may be great, the detached bodies of skirmishers would be rather more apt to lose their direction even if connected by a section, than would a continuous line of skirmishers or swarm. In both plans skirmishers depend upon the line to come up and strike the decisive blow. By themselves they are as much inferior, numerically and morally to the swarm, as the latter is to the line, and in a long moving fight the line may have got too far off, or the intermediate ground be too bad for it to render prompt assistance or take advantage of an opportunity.

The skirmisher swarm is strong and well placed for rapidly availing itself of any opening that may offer, it is therefore not obliged to wait continually for the line to come to its assistance, with the consequent gain of time to the enemy; in addition to this it maintains a heavy fire, thus turning to good account the disadvantages a retreating enemy is always under, namely—

Being more or less discouraged or demoralized by the act of retreating, while the troops pursuing are similarly encouraged; not being able to keep so well under cover, for they are moving in one direction and must be covered towards another, having to turn round to fire, etc.

I think it is clear, therefore, that for a pursuit the skirmisher swarm is superior.

To pass to the swarm from the proposed formations for attacking a position, and *vice versa*, more companies can be extended in the open space in their front, or the proper parts of the skirmishing line remain behind when the rest move on respectively.

SECTION V.

Frontal Defence of a position by Infantry, and formation during retreat.

As in discussing offensive tactics we will confine ourselves to considering frontal defence only : and firstly as to that of a position.

We may apply the principle of exposing only one line to fire by placing the supports a little beyond and in rear of the flanks. They will here also be best posted for opposing or making a flank attack. If there is not room beyond, they should be placed in rear of the flanks as the centre will be most fired upon. The supports should be nearer the front line in defending than in attacking, as in the former case they may be required at any moment to keep the enemy out or prevent him from making good his hold of the position, and being stationary they can keep better under cover.

It does not appear to answer to post skirmishers in advance of the position, for their inevitable retreat before the skirmisher swarm is apt to have a moral effect on both sides to the disadvantage of the defence. Also, when retiring they are at a disadvantage for the losses of a retreating body are relatively much greater than of one pursuing. They are also then in the way and prevent the defenders in the main position from firing, and in addition to this any cover such as rifle pits, &c., that they may have prepared in turn assists the enemy when he reaches their position. Advanced posts may however be employed as formerly to delay the enemy, by forcing him to an early deployment and to bring him as soon as possible under fire.

As far as the defence of the main position is concerned, it is better for a few only to occupy the front line at first, and reply to the enemy, and afterwards to sweep away the attack at a short range by the fire of a well-covered line.

If the front line can be reinforced without exposing the fresh troops, it should at first only be occupied by the few skirmishers required to reply to the enemy's fire at a long range, and marksmen and first class shots should provide these men. These should be reinforced as the enemy arrives 500 yards from the position, and when he is about 350 yards distant, and is reinforcing his skirmishers by his supports or has done so, he is fired upon by a single rank line which is again reinforced after a time by the rear rank if he attempts to approach nearer.

If the reinforcing troops would be exposed to fire, the front line should be occupied two deep from the first, the rear rank lying down and not firing till the enemy attempts to approach within 200 yards, or to retire from that position, and as before, only a few of the front rank men should be allowed to fire at the longer ranges.

But this is by no means so certain a plan of reserving ammunition and the control of the troops as the former. The longer they fire the

less in hand they become, and the temptation to do so is very strong to men who find themselves well placed for the purpose, and actually being fired upon at the time, at least by the enemy's artillery; to refrain under such circumstances tests their discipline and steadiness in no small degree, and it is therefore better when possible to keep the men, not required at the time in the front line, altogether behind and under cover.

The objects therefore aimed at by the plan for the frontal defence of a position are:—

1. To absolutely prevent unnecessary confusion and waste of ammunition.

2. So to place the supports that they may suffer least, but may be quickly available when required. To expose to fire in the front line no more men than are necessary, especially at first when the enemy is shelling the position, and until this ceases owing to the near approach of his infantry.

3. To obtain the moral and physical advantages of reinforcement at the decisive moment, together with the heaviest fire at the shortest range.

4. To employ the moral and physical force of closed troops.

I cannot agree with those who would recommend the first line to be occupied by skirmishers only throughout, and the great effort and counter attack to be made after the enemy has got into the position; for however strange he may be to it he will at once find some cover and throw the onus of the attack on the defenders, while his supports and guns hurry up to assist.

Beyond doubt we should anticipate the contingency of the enemy forcing his way in and be fully prepared to turn him out again. But we should teach all ranks that the enemy is to be kept outside on the perfectly open ground under fire and not to be eventually permitted to enter that he may be the better driven out, for the latter might be found difficult, when he has the advantage of cover from the hedge, wall, ridge or even, bank of shelter trench of the original position and already the moral force derived from a partial success and advancing reinforcements to back him up; as Boguslawski says, we should teach the men that they have nothing to do but lie still and keep up a heavy fire, and that if they don't go away the enemy must.

One more argument against allowing the enemy into the position before making the supreme effort to overwhelm him.

The ridge or wall, etc., of the position will prevent all or much of the defenders' fire, from striking the enemy's advancing supports.

With regard to the formation of troops retreating.—

In some respects that proposed for the attack of a position would answer better than for a pursuit.

Thus, the chance of loss of direction or interval by the detached bodies of skirmishers, if the first mentioned arrangement was employed, would not exist, for they would follow and be guided by the movements of the line.

The ground passed over by their own main body could no longer conceal an ambush to fall on their inner flanks, when screened by obstacles from support.

The line can come to the assistance of the skirmishers by merely halting ; it is not necessary for it to hurry up and overtake them as it would be in a pursuit.

It is subject to a smaller consequent disadvantage however, namely, that in retreat the line after assisting the skirmishers would have to hurry after the main body if it was necessary to regain its distance, whereas in pursuit it could do so by halting.

The skirmishers would not be strong enough to properly oppose and retard the pursuing swarm, it would therefore be necessary for the line to come frequently to their assistance ; and, we must remember that after doing so it must eventually retire and follow the main body ; but retreat at close quarters on most ground now means destruction, especially to troops in a close formation, and as the line could do little good except at a range where there is a probability of coming frequently to close quarters, the formation would appear to be not better suited for retreat than we have seen it to be for pursuit. Finally, the swarm can best take cover if surprised by the enemy, while on such occasions closed troops might be almost annihilated before they could do so. This of course applies both to troops in pursuit or retreat.

Battles may be regarded as a series of attacks and defences of positions, alternating with pursuits and retreats. I have proposed plans for the former and endeavoured to show that their adoption would be advantageous, and I submit that it would appear from what has been said, that the skirmisher swarm well supported is better suited to the two latter incidents of the fight than the old line system, or line with strong bodies of skirmishers in echelon to it, as I have proposed.

SECTION VI.

Shock Tactics, &c.

We cannot pay too much attention to controlling the fire of our troops, who should be taught to reserve it too much if anything, rather than too little, as the tendency in action is to waste ammunition and time at the long ranges, which frequently causes a deficiency of the former at the short ones, with consequent defeat. Troops, however good their weapon, must do their real fighting at the short ranges, no decisive

results can be obtained otherwise. The longer the distance at which they commence to fire, the less in hand they will be at the decisive ranges. The necessity of firing deliberately cannot be too much impressed upon the men, as it is the amount of accurate fire only which tells, and also that of promptly moderating their fire as may be directed by their officers.

To judge from what we have seen in 1870, it is improbable, that the enemy would allow a much closer acquaintance to be formed with him than the line would be able to make at the 150 yards' position, and that greatly shaken by the terrific fire he would retire at the first sound of the charging cheer, and on seeing the line rise and rush to the front surely a skirmishing swarm if occupying the front line would do so.

During the recent French and German War bayonets were not crossed once in the open ; still we must provide in our formation for the possibility of an enemy's good "*morale*" and confidence, derived from being well posted and well led, rendering a recourse to the Old Shock Tactics necessary in exceptional cases, and if the enemy saw that due preparations as to formation fixing bayonets, etc., had been neglected, he would be all the more likely to stand firm, while the attacking party would feel themselves really unprepared.

It appears to me most worthy of remark, that in two out of the three last great European wars that party succeeded who were continually attempting to approach the closest to their adversary, and in the third the failure of these tactics may, I think, be explained.

During the whole of the war of 1859, the French had, I believe, express orders to close on the enemy with the bayonet whenever possible. This, no doubt, had its moral effect on both sides. The French had nerved themselves for, and made up their minds to seek bayonet fighting, while the Austrians having previously had no particular instructions on the subject would have been just as well satisfied had the fire fight continued instead. One side, in fact, was eager for a certain relative position of the combatants, while their opponents not being so anxious for it were the first to retire. Also, supposing both sides equally willing to come to close quarters the moral effect in favor of the charging troops is great if they act resolutely.

In the war of 1866, the Austrians in imitation of the tactics which were probably the cause of the French victories of 1859, issued similar orders to their troops, but they were defeated by the fire of the breech-loader, the effect of which they had not anticipated, and to meet which they were wholly unprepared. They were also out manœuvred, whereas in 1859 the opponents had been about equal in this respect, neither paying much attention to it either in strategy or tactics.

Lastly, in the war of 1870, the Germans having an inferior weapon which could not be relied upon at the long ranges consequently found it necessary always to hasten to the short ones. The French on the other

hand, though nothing loth to hard close fighting, would not have been discontented to remain beyond the effective range of the Needle Gun and within that of the Chassepot. The same remarks may be made therefore regarding this, as regarding the bayonet charges of 1859, the teaching of which war it corroborates on this point.

It thus appears that it would probably be fatal to an Army to become possessed of a superior long range rifle, if it caused firing at long ranges to be adopted as anything but a mere diversion.

This is also the opinion of Boguslawski based in particular on his experience during the war of 1870-71, *vide* page 84 of his Tactical Deductions.

Let us hope, that the principle of our offensive tactics will always be to reach and close with the enemy as rapidly as possible consistent with the way at each stage of the attack being properly prepared by fire.

The above, that the enemy's flanks are his weak points, and other valuable maxims we should constantly instil into the minds of all ranks by means of theoretical instruction, then when armed the deafening sound of breech-loading arms at close quarters and the excitement of battle, control of the men is difficult, they will be able the more rapidly to understand and effectively to perform what their commander has in view, and in default of instructions, to of themselves know and do what is best.

Major General Sir Henry Norman said:—I am glad that Captain Fife has taken this opportunity to deliver a lecture, an example which I hope will be followed not only at Agra but at other places, especially by officers who have leisure at Hill stations, also at Camps of Exercise. Great changes are now taking place owing to the effect of the breech-loader, and I believe that if alterations are judiciously introduced into our system of tactics, due regard being had to the peculiar and excellent qualities of the British soldier that we will now have no more cause to fear for success than we had under former conditions.

I beg to thank Captain Fife, and I am sure I may also do so in behalf of all present for the interesting lecture he has delivered, and which has evidently been prepared with much care.

Lieut.-Colonel Blewitt said :—The example set by Captain Fife of thus bringing a military subject under discussion is valuable, as it tends to draw the attention and consideration of officers to this and similar points, and all thought and discussion on such subjects is extremely useful.

I beg to thank Sir Henry Norman for taking the chair on this occasion, not only on behalf of myself and those who are present, and I am sure especially on that of Captain Fife, but also on the part of all the officers of my regiment.

VI.

THE ARMY OF NETHERLANDS' INDIA.

THE Army of Netherlands' India is composed of Europeans, who volunteer for service in the Dutch Indies, of natives of the Archipelago, and till the cession of Elmina to the English of a small proportion of Africans.

The great bulk of the natives of the Dutch East Indian islands, who take military service are Malays, recruited principally from the island of Java ; but few of the natives of Sumatra, Borneo or the Moluccas ever enlist, and none of the Papuan type inhabiting New Guinea, the Aroo islands, &c.

The natives of Amboyna in the Moluccas, however, (who as a rule are Christians) and who make excellent soldiers, and the natives of the Celebes enlist in great numbers ; as also the Javanese, inhabiting the central part of the island of Java and the Sundanese, from whom the native cavalry is recruited—and who live in the Praenger or western part. The coast line and the eastern part of Java are those parts of the island from which most of the native troops are recruited, and are inhabited by the Malays properly so called.

General Organization.—The Army consists of 27 Battalions of Infantry, 1 Regiment and 9 Detachments of Cavalry, 21 Batteries of Field and Mountain Artillery, with a proportion of siege and garrison guns and a corps of Sappers.

It is entirely independent of the home army of Holland, and the men are enlisted for service in Netherlands' India only. It is divided into 7 Divisions or Districts, 2 being under the command of Major Generals, the remainder commanded by Colonels and Lieutenant-Colonels ; the whole being under the orders of a Lieut.-General Commanding-in-Chief, who is at the same time Minister of War in Netherlands' India.

The Divisions are distributed as follows :—

I. Three Divisions in the island of Java ; Head Quarters at Batavia, Samarang and Soorabaya.

II. Division of Western Sumatra and dependencies, Head Quarters Padang.

III. Districts of Lampong, P em bang, Banka, Riow and dependencies.

IV. Division of Western Borneo. Head Quarters Pontianak.

V. Division of Southern and Eastern Borneo, Head Quarters Bandjermassin.

VI. Celebes and dependencies, Head Quarters Macassar.

VII. Moluccas, Head Quarters Amboyna.

The Infantry and corps of Sappers is composed of both Europeans and Natives, there being a certain proportion of both in each battalion, as also in the Artillery, but the Regiment of Cavalry is composed entirely of Europeans, the "Detachments" of Cavalry only being natives.

Infantry.—The Infantry consists of about 21,000 men, of whom about 6,000 are Europeans; and may be divided into two parts;

1st. That maintained for garrisoning certain important posts, consisting of 10 battalions and 5 companies. 2nd. That which may perhaps be called the Field Army, which is available for any contingency which may arise and is composed of 17 Battalions.

Each Battalion (having a cadre or depot composed entirely of Europeans) is made up of 6 companies of about 130 men each, the two flank companies being Europeans, the remainder natives. The natives of Amboyna, and of the Coast of Africa (who as a rule are Christians) are considered as Europeans, in so far as relates to the proportion of Europeans to natives, that is to say, that in some few battalions, the 2 flank companies are either Africans or Amboynese. In 4 battalions (the crack corps) the native portion of the battalion is composed of Africans only, and in 2 out of these 4 battalions, the proportion of natives to Europeans is reversed, there being 4 companies of the latter to 2 of the former. The company Sergeant Major and 3 senior Sergeants in each company are always Europeans.

Arms.—The whole of the Infantry, no distinction being made between Europeans and natives, is in course of being armed with the Beaumont breech-loading rifle. Till lately they have had the Kuhn rifle, also a breech-loader.

Officers.—Each battalion is commanded by a Lieut.-Colonel or Major; there being 9 Lieut.-Colonels, and 8 majors on the Establishment of the Field Army, and to each company there are 4 officers, *viz.*, a Captain and 3 Lieutenants, some having 2 First Lieutenants, and 1 Second; others 1 First and 2 Second Lieutenants.

The natives of Java Proper and of Amboyna only are eligible to become officers, and receive half the pay of the European officers.

Cavalry.—The cavalry consists only of one regiment, composed entirely of Europeans, consisting of 8 troops of 72 men each; and of nine detachments of native cavalry, which are under the orders of the Commandant of Cavalry and are commanded by European officers. The strength of two of these detachments is 48 men each, of one 38 men, and of the remainder 26 men.

Arms.—The whole of the Cavalry is armed with sword and pistol.

Horses.—The horses are small and undersized, though strong and hardy, the minimum standard of height being about 12 hands $1\frac{1}{2}$ inches, or according to Dutch measurement 1 metre, 2 decimetres, 5 centimetres and 6 millimetres.

They come chiefly from the islands of Macassar and Sandalwood, being purchased as required. Their average cost is 260 guilders or about £21 13s. 0d. the maximum price allowed by Government being 300 guilders or about £25 sterling.

They are never shod.

Artillery.—The Artillery is also composed of both Europeans and Natives, and numbers 21 Batteries, which are divided into Light Field Batteries, Heavy Field Batteries, Mountain, Garrison, and Siege Batteries.

Light Field Batteries.—These Batteries are each composed of 8 pieces of ordnance (canons de 3 C. S. B); to each gun 4 horses, the drivers of which are natives.

The gun detachment consists of 6 gunners, of whom 2 are natives. The No. 1 of each gun is always a European Non-Commissioned Officer.

The detail of a Battery is as follows:—

Officers	...	...	5
N. C. Officers	...	...	29
Gunners (European)	...	...	33
„ (Native)	...	...	25
Drivers	...	...	27
Trumpeters	...	...	4
Farrier	...	...	1
Horses	...	...	54

On a war footing the number of gunners (natives) is increased to 58 drivers to 56, and the number of horses to 112.

Heavy Field Batteries.—Each battery is composed of 8 pieces of ordnance (canons de 4 Rifled calibre 3.406), drawn by 8 horses. The 4 drivers are natives and of the gun detachment, the No. 1 is a European Non-Commissioned Officer, four gunners are also Europeans and two Natives. The cadre is the same as that of a Light Field Battery, but the effective of men and horses differs. On a peace footing it consists of—

42 Europeans.

65 Natives.

68 Horses.

On a war footing—

42 Europeans.

123 Natives.

170 Horses.

At present (May 1873) there are only 4½ Batteries of the

Mountain Battery.—There is one Mountain Battery. It has with 6 small mortars of 4.745 calibre (mortier de 12), and 6 howitzers of the same calibre. The latter are drawn by 2 horses each, but the mortars, their beds, and shells are transported on mules.

The establishment of this Battery is as follows :—

- 5 Officers.
- 2 Adjutants (1 Native).
- 2 Sous Officers.
- 11 Sergeants (1 Native).
- 12 Corporals (2 „).
- 2 Trumpeters.
- 79 Gunners (35 Native).
- 13 Drivers (12 Native).
- 54 Horses.

On a war footing the number of native gunners and drivers increased to 62 men and the horses to 112.

Siege and Garrison Artillery.—The Siege and Garrison Artillery is composed chiefly of Europeans, being in the proportion of 1 European to 34 Natives, and is for the service of the few batteries mounted in the fortresses scattered over the Netherlands' India. The cadre is the same as that of the Field Batteries.

On the failure of the expedition against Acheen in 1861, the want of more rifled guns was strongly felt, and the Colonial Government urgently applied to Holland for several more batteries. The next expedition doubtless a formidable rifled Artillery will be at the force.

Sappers and Miners.—The Corps of Sappers and Miners consists of 3 companies, composed half of Europeans and half of Natives.

Troops of Native States.—The troops belonging to the dependent Princes, consist of Cavalry and Infantry, and are composed entirely of Natives, with the sole exception of a few European instructors for the officers. They are badly armed, clothed, and equipped, and but for parade purposes are, as a rule, of little use.

Enlistment, &c., &c.—All soldiers are enlisted for a term of 6 years, and after that term they may be re-engaged for a further term of 3 or 6 years. Europeans for a further term of 3 or 6 years service, Natives for 2, 4, or 6 years.

After their first term of service (6 years) they can, if they wish, be re-engaged for a further term of 3 or 6 years. Europeans for a further term of 3 or 6 years service, Natives for 2, 4, or 6 years.

The former receive, on so doing, a chevron carrying with it an increase of pay amounting to 6 cents per diem, the latter a chevron and 2 cents per diem.

N. B.—100 cents is a guilder. 1 guilder = 1s. 8d.

Age on Enlistment.—Europeans are either enlisted in Holland and sent to join the East Indian Army, or are enlisted on the spot: they must be between the ages of 19 and 26, but can by special authority be enlisted at the age of 17 years, in which case it must be for a term of 10 years instead of 6.

Standard of Height for Natives.—Natives must be from 19 to 35 years of age, and of a minimum height of 1 metre, 5 decimetres, or about 4 feet 11 inches.

Retirement.—The Europeans after 20 years' service, and the Natives after 30 years' service, can retire on pensions, the former at the following rate.

Private	200	guilders	per	annum.
Corporal	240	"	"	"
Sous Officers	300	"	"	"
(Guilder=1s. 8d.)				

The Natives at a lesser rate equal to about a half of the above.

Pay.—Each European soldier receives 35 cents per diem, each Native 29 cents per diem.

Rations.—And in addition a ration of meat, bread, and rice, the bread issued to the Natives being of somewhat inferior quality, but on the whole the rations are exceedingly good and plentiful.

Clothing.—The Europeans and Natives, of all branches of the service are all clothed alike (the Cavalry wearing cap lines, spurs, and booted overalls,) in dark blue serge tunics with roll collar, trousers of same material and quite plain, and chako. The Europeans, Amboynese, and negroes receiving in addition, boots, socks and drawers, but no helmets or solar "topees" of any description, their chako being precisely similar to that worn by the Natives.

Barracks, &c.—The whole of the troops, both European and Natives, are accommodated in Barracks. Amongst the Europeans marriage is not recognised by the authorities, but if there be room to spare, a few deserving Sous Officers and Corporals are allowed to have their wives in barracks. The rest however are permitted to have their wives in huts (which they must build themselves) outside the barracks, and leave is always given to a certain number to be absent till the next morning's parade.

The natives are quartered in barracks along with their European comrades, each man having a small sort of married

quarter allotted to him, in which he may live with his wife and family. Every indulgence is shewn by the Dutch authorities towards the native soldiers on the subject of marriage. A certain number of wives, paid by Government are allowed to accompany any expedition, and those left behind receive rations and a small amount of pay.

Canteens, "Institutions," &c.—The Regimental Institutions, Canteens, &c. &c., are as a rule admirably arranged. The Canteen is managed by a committee of officers, the surplus funds going towards providing amusements for the use of the men.

The Regimental Library is also kept supplied with books of instruction and amusement and some few works in foreign languages, out of the profit gained by the sale of liquor in the Canteen.

When this sum has reached a certain amount, the Canteen Committee assembles, and aided by the sous officers and N. C. Officers, determines the method in which it should be laid out to the best advantage of the men in the regiment.

The "sanitation" appeared to be exceedingly well looked to, running water being laid on through the barracks and swimming baths provided. Owing to the plentiful rainfall and hilly nature of the country this is nearly always feasible.

Officers' (qualifications and appointment of).—Officers are sent out direct from Holland to join the Army of Netherlands' India as Lieutenants, having previously passed the qualifying examination.

Officers of the Royal Army can however demand as a right, which is but rarely refused, to be sent out to the East Indian Army after 5 years' service with the Royal Army in Holland, and with the rank which they held in Europe. On joining the N. I. Army, they become part and parcel of that army, and have not the option of returning to Holland except on furlough or when sick.

Amongst the Natives only those of Java Proper and of Amboyna can become officers, receiving half the pay of a European officer.

N. C. Officers can also be promoted to the rank of officer, but have to pass a qualifying examination and must not be more than 30 years of age.

All promotions and appointments, up to the rank of Colonel inclusive are made by the Governor General of Netherlands' India in Council, but the two Divisional Commands and the appointment of Lieutenant General Commanding-in-Chief are in the gift of the Crown.

Pay.—The pay of all ranks is the same as in Holland, but one year's service in the East Indies counts towards pension as two in Europe; thus an officer has the option of retiring on a pension after 20 years' service, instead of after 40 years as in Holland.

Pension.—Every officer can retire on a certain fixed pension in proportion to the pay of his rank at the time of retirement, after 20 years' continued service exclusive of furlough. After 20 years' service, if an officer wishes to serve on till he becomes promoted to a higher rank, he must serve for two years in that rank before he can retire and claim the pension appertaining to it.

Furlough.—Furlough (except on sick leave, which can always be obtained on proper medical certificate) may be granted to an officer after 12 years, for any period not exceeding 2 years. During this time the officer forfeits all right to promotion and loses 25 per cent. of his pay. The whole of his time on furlough also counts against his service towards pension.

After 15 years' service furlough can be obtained for any period not exceeding 2 years; half of this term of furlough counts against service for pension, but the officer keeps his place for promotion, and only loses 10 per cent of his pay.

E. DUNCOMBE SHAFTO,
Captain, A. D. C.

BANGALORE :
 17th September, 1873. }

VII.

THE ESTABLISHMENT & ORGANISATION OF AN ARSENAL,

BY LIEUT. E. H. H. COLLEN, R. A.,

Staff College, Sandhurst.

The R. A. Institution Prize Essay of 1872.

"Fortes pejoraque passi."

IN the bright light which the spirit of our times throws upon all matters touching the profession of arms, we may expect to see those paths of military administration which are clear to the few and obscure to the many lit up and thrust into bold relief.

Up to a date not very remote, but little attention was paid in this country to a study of the principles of organisation, and the methods of supplies, the best adapted to the British army. Just as at one time the highest idea of tactics was "to go straight on and beat the enemy," so in administration the methods of supply were, good or bad, very much dependent upon the degree of ability possessed by the fighting leader.

This epoch of our military history is now passing away ; the system of administration must gradually settle, and assume some permanent form adapted to our national characteristics and the varied requirements of our service. The time has passed when we could assert that pluck and money would pull us through every kind of danger and emergency. Modern warfare admits of no delay, allows no time to a nation prostrated by a heavy blow to recover its strength. Every combination of danger must be provided against, every phase of battle practised, every difficulty of supply prepared for. The day has gone when we could point proudly to a great commander to combat every foe by turn, to remedy every evil of administration. The Duke of Wellington was a *system in himself*, and when he left us, he left us without a system." It is, then, the task of the soldiers of the present day, each in his own sphere, to try and work out the many questions which must be solved, and to assist in the building up of our system of military administration upon a sure foundation.

If, then, it may be conceded that the time is fast approaching when the soldier who aims at distinction must understand and appreciate every part of the great machine by which an army is worked, I may hope to attract to the subject of this essay the attention of those who would pass it by as not concerning the active duties of their profession, and as a matter that might well be left to the few who have made this branch of the artillery service the business of their lives. It requires, however, but little consideration to show how deeply and intimately is connected the duty of supply with those military operations which form the chief study of soldiers. Few of us indeed may be called upon actually to organise an arsenal, but still every artillery officer should consider the principles which should govern the working, while our brother officers of

other branches of the service will not find it vain and unprofitable labour to look into a matter which may be of deep importance to a general and his staff, whether in the defence of this country or in foreign expeditions or wars.

The national scheme of military organisation which has been so lately placed before the public, recognises completely that decentralisation in respect to warlike stores, which must accompany an attempt to form a force of the higher tactical units, each complete in itself.*

It has long been a subject of discussion as to whether we ought not to have a central arsenal, and by this means avoid the accumulation in one spot of our military manufactories. Under the new condition of things, however, all our forces will be supplied from local depots, and it is not unreasonable to hope, that at no very distant time we may possess a central arsenal of construction sufficient to supply, with the assistance of the existent private manufactories, all the wants of an army in the field. Be this as it may, there can be no doubt that, under the new system of army organisation, the General and Staff Officers of those portions of the country which may eventually correspond to army corps, must make themselves so well acquainted with their respective districts and their resources, that in the event of national danger or emergency, they would be able to make arrangements for the construction and manufacture of such warlike stores as would be demanded by an army in the field. However impossible it may be for them to attain that detailed knowledge of construction and supply which long experience alone can give, it will still be incumbent upon the responsible administering officers to understand and apply the governing principles.

In the colonies, and in India, and in the variety of circumstances of country and climate under which British officers may be called upon to serve, it is not difficult to see how useful a knowledge of organisation may be, whether connected with the supply of *munitions de guerre* or *munitions de bouche*—the two great kinds of food upon which the life of an army is nourished and supported. Nor is it a small thing that the combatant officers of the army of all classes should understand the process of administration, and be able to appreciate the difficulties of supply. The harmonious working of all branches and departments of the army can only be attained by mutual knowledge and mutual dependence; by a strong check being put on the tendency to regard one's own branch as the only part of the great machinery to be taken care of. Unless this check be applied, not by outside regulations, but in our own ideas and habit of thought, then this inevitable result follows—the machine is thrown out of gear, because we are trying to work one part at the expense of the remainder, and we realise what is meant by disastrous administration, by the “organisation of defeat.”

* “According to these arrangements, the troops of the reserve would be equipped for either of the foregoing objects in respect to arms, accoutrements, clothing, or expense ammunition from the depot centres; the regular and reserve forces both obtaining camp equipage, field stores, and reserve ammunition from the district issuing store.”—Report on the Organisation of the various land Military Forces of the Country, by a committee assembled by order of the Secretary of state for War.

In treating this large subject it may be as well to lay down the order generally in which it may be dealt with, and it will be convenient to detail the order in this place, *viz* :

1. The definition of an arsenal.
2. The circumstances under which an arsenal may be established.
3. The considerations which govern the position of an arsenal.
4. The general principles of the organisation of an arsenal.
5. The details of the organisation of an arsenal, divided under three heads, *viz* :
 - A. Storekeeping.
 - B. Construction.
 - C. Administration.

1. THE DEFINITION OF AN ARSENAL

An arsenal is an establishment for the construction, repair, receipt, storage, and issue of warlike stores.

Arsenals may be divided into two classes—

First-class arsenals,

Second-class „

In first-class arsenals, every want of an army and the military service* in respect to munitions of war must be provided for. An army requires guns of many kinds, and all the innumerable appliances connected with keeping these weapons in order, their service, and repairing them when damaged. It requires wood and iron carriages for the guns, hundreds of stores connected with guns, their carriages, and their service, as well as transport carriages of all kinds. It requires projectiles—shot, shell, incendiary and miscellaneous, including rockets: varieties of charges for firing the guns, or for bursting the projectile; the means of igniting these charges—as tubes, portfires, &c.; the means of igniting the bursting charges—as all the varieties of fuzes. An army must be supplied with all kinds of small-arms, including rifles, carbines, pistols, swords, bayonets, lances; all the implements used in connection with these arms, and the necessary cartridges for the rifles, carbines, and pistols. It must be supplied with entrenching tools, and, indeed, tools of every description; all kinds of engineer requirements, including pontoons, military railway construction materials, telegraph materials, &c. An army requires harness and saddlery, and all sorts of accoutrements, and in our service a vast quantity of camp equipments. Lastly, it requires such tools and materials as will enable its artificers to keep every thing in repair.

* And in certain cases, of the naval service also.

In this imperfect summary of the requirement of an army, I have necessarily excluded those necessities which rather come under the heads of clothing and *munitions de bouche*.

These requirements of an army, therefore, demand the following establishments in a first-class arsenal of construction and store, in addition to great storehouses :—

1. Gun Factories.
2. Carriage Department.
3. Laboratory.
4. Small-arms Factory.
5. Harness, Saddlery, and Tent Factories.
6. Powder Factory. (This latter, however being removed from the arsenal itself, but connected with it in the matter of administration.)

Second-Class Arsenal.

In an arsenal of the second class, the great manufacturing establishments of the first-class arsenal are compressed into workshops for partial construction and for repair, the store department being of equal magnitude and importance with that of the first-class arsenal. Provision must, however, be made for manufacture, to a limited degree, so that by the judicious position and arrangement of our arsenal, we may be prepared to utilise the manufacturing resources of the district in time of pressure or danger.

With the construction of guns, and the various elaborate processes to which the metal is subjected before being placed in the hands of the artilleryman, a second class arsenal is hardly concerned, although its workshops must be adopted to perform certain minor operations connected with ordnance.

While it would be necessary to provide for the chief kinds of ammunition used for field purposes, it would not be possible to have such an establishment as would suffice to manufacture the numerous varieties of ammunition required for siege and naval purposes.

Again, while the second-class arsenal in peace time would be unable to turn out large batches of carriages, it should be able to make and repair gun-carriages and other carriages used in the field, and form the nucleus of a larger establishment for this purpose. In addition, the second-class arsenal should possess workshops for the repair of small-arms, and for the manufacture on a limited scale of harness, saddlery, and accoutrements.

2. THE CIRCUMSTANCES UNDER WHICH AN ARSENAL MAY BE ESTABLISHED.

The foregoing definition does not pledge us to an acceptance of the principle that one division of labour is of more importance than another

in constituting an arsenal ; nor should it do so, for the circumstances are varying under which an arsenal may be established, and no absolute rule can be laid down to govern every case.

The following appear to be the general divisions of this branch of the subject. We may have to establish an arsenal in—

- (1) England.
- (2) India.
- (3) The Colonies.
- (4) A foreign country, during a war with that country.
- (5) A foreign country inhabited by a savage nation, as in an expedition against that nation.

In the first case, an arsenal might consist of establishments for manufacture, and for storage of munitions of war.

In the second case, it would probably consist of large establishments for storage, with small factories or workshops for repair and replacement.

In the third case, large establishments, for storage, combined with the adaptation of any existing factories to the manufacture of such munitions of war as could be made in the country.

In the fourth case as our base of operations would usually be on the sea, we should rarely be able to secure the advantages of the factories of the country situated at the centres of population, and the arsenal would generally become an extensive depôt.

In the fifth case also the storage of munitions of war and the formation of a field arsenal would be the primary considerations.

In considering the nature of the arsenal we should desire to establish in England, I think it must be assumed that the grand factories at Woolwich, whose organisation and superintendence have received no small meed of approbation from the highest authorities of this and other countries, can form no absolute example to the military administrator. In the Royal Arsenal at Woolwich are comprised vast ranges of works which no state could afford to reproduce and support in a second locality. The Royal Gun Factories, the Royal Laboratory, and the Royal Carriage Department are establishments we may desire to transfer to some more secure part of the kingdom, but whose splendid scale we cannot hope to imitate.

In the establishment, therefore, of an arsenal in England, my remarks will apply chiefly to a second-class arsenal, or "great military depôt," in which a certain amount of military stores should always be preserved, in order that the country may not be deprived of its military resources in the event even of Woolwich falling into the hands of an

enemy, and which may also be used temporarily, to a certain extent, as an arsenal of construction on an emergency ; or, at all events, as a place for the reception or fitting of such *matériel* as may be furnished by the neighbouring workshops.”*

In India, the natural bases of supply are found at the great ports and capitals—*viz.*, Calcutta, Madras, Bombay. Around these are grouped the factories, or within convenient distances ;† and the various arsenals necessary for the supply of the fractions of the army scattered over the vast empire, are placed at the secondary bases and strategic points. In this case, also, the duty of an officer charged with the establishment of an arsenal would be confined to the creation of a large military dépôt, but provided with workshops for construction to a limited extent, and for repair.

In the colonies and in foreign countries—cases embraced under the third, fourth, and fifth heads (see *ante* p. 5) we see that the establishments would properly belong to a second-class arsenal. Circumstances, however, might occur in which we might have to establish factories, but the probability is so remote that we must subordinate this branch of the subject to that which appears more likely to occur in actual practice. At the same time, it will be right to touch upon the larger question, however difficult or even impossible it may be to enter into details, concerning which a consideration of the place and time can alone afford a real and practical decision.

3. THE CONSIDERATIONS WHICH GOVERN THE POSITION OF AN ARSENAL.

The position of an arsenal will invariably be governed by strategical considerations.

An arsenal should be situated at the base of operations, whether for offensive or defensive purposes. Jomini draws a distinction between the base of operations and the base of supply, but this distinction cannot apply to the furnishing and replacement of munitions of war. In defensive operations it must be situated near that point which is the best adapted in all respects to form a last stand-point against attack, and from which a successful counter-stroke may be launched at the assailant.

It must be secure from attack, placed at that point from which the transport of stores can be effected with the greatest facility, whether by rail, water, or road—a combination of all three means of transit being the most to be desired—to the various parts of the area to be supplied.

It should never be too near the frontier, or outer line of defence.‡

* Royal Commissioners on National Defence, May, 1860.

† The Carriage Factory in Bengal is, however, at Futtehgur, far up the country.

‡ Metz. War of 1870-71.

An arsenal should be placed so that it can with facility draw in the resources of the country in minerals, timber, and the great mass of raw material required for the construction of munitions of war.

Safety and facility for supply and transport are the chief considerations which must decide the position of an arsenal; and whether for offensive or defensive war, it must be protected by such fortifications as shall ensure its defence by a small force against superior numbers, and oblige the latter to undertake its siege or investment with every probability of final failure.

Provided these conditions are fulfilled, at or near the centre of a manufacturing population would be found the most suitable position for the establishment of an arsenal; for in a position of this kind we might expect to find men, machinery, and *matériel*, which could, in a great emergency, be diverted from their ordinary business and applied to the production of warlike stores, supplementing and expanding the smaller organisation of peace time.

In foreign states we look for large arsenals at the great pivots and bases of offensive and defensive operations, guarded by fortresses* which have grown up with the necessity for the supply and renewal of manœuvring armies.

In our insular position, however, the necessities of our navy, the defence of our harbours and dockyards, have naturally obtained the first rank in importance, while our arsenal and factories have grown into great establishments under the combined action of the requirements of the navy, of our possessions abroad, and the convenience of water transport.

But this convenience is coupled with danger. The concentration of the whole of our constructive establishments upon our outer line of defence is a great evil, and the causes of which we may look for, beyond those I have mentioned before, in the necessity for economy as well as in a disbelief of the possibility of invasion.

In the admirable plan of organisation lately presented to the country—perhaps the greatest step towards the insurance of our independence which has ever been made—we have advanced a considerable way, by the policy of decentralisation of stores.

It is perhaps too much to expect that, following close upon the costly measure of reform about to be commenced, we should suddenly

* “ But these should be something more than fortresses—they should contain sufficient material for a great army in artillery, firearms, provisions of all kinds, workshops, arsenals, hospitals; in fact, collecting all the raw material which naturally flows from the surrounding district into a great city, they should be capable of converting it, by means of a large population of artisans and of extensive manufactories, into the material of war—of turning brass into cannon, iron into projectiles and rifles, wood into trains of wagons, wheat into biscuit, canvas into tents, &c.”—Hauley's *Operations of War*, 2nd Ed. p. 307.

begin to establish one or more arsenals in a central part of the kingdom. It will, however, ultimately be necessary, and let us hope at no very distant period, to complete the comprehensive scheme brought in by the present War Minister, by the establishment of one or more arsenals for the manufacture of the simpler kinds of ammunition, &c., and for the storage of other munitions of war, which shall secure our defensive army the proper supply of these under all circumstances of difficulty.

I am unwilling to leave this important part of the subject without quoting the words of Sidney Herbert, who, in a letter to Major-General Sir Harry Jones, K.C.B., Royal Engineers, Chairman of the Royal Commission on National Defences, dated 25th November, 1859, says :—

“I have the honour to acquaint you that her Majesty’s Government have decided it is desirable that the store of guns and warlike *matériel* should no longer be concentrated in one place.”

Following upon this came the recommendation of the Royal Commission, in a letter dated May 1860, and their remarks are so important so closely allied to one of the chief subjects of this essay, and so completely summarise the conditions which should guide the choice of a site for a central arsenal, that I cannot forbear quoting them at length :—

“It appears to us, therefore, that the second arsenal should, as far as possible, be complementary to Woolwich, and should possess those properties in which the latter is deficient.

“To accomplish this, the first requirement seems to be that the new arsenal should be situated nearly in the centre of the country, and as far as possible out of the reach of an enemy making a descent on our shores from any quarter.

“Secondly, it should be situated on the line of retreat that the national army would probably adopt in the event of its being unable to resist the progress of an invader, in order that it might serve as a rallying point, where the resources of the country, both in men and *matériel*, might be collected and organised.

“Thirdly, it is indispensable that it should possess ready means of communication, both by canal and railroad, with the Thames and Severn, the Mersey and Humber, and with the principal seaports of the kingdom.

“Fourthly, it should be situated as nearly as possible to some of the great mineral districts possessing a supply of coal and iron, and in the immediate proximity of a population accustomed to metal working, who might, in an emergency, be employed either in the arsenal, or to supply it with the requisite stores.

“Fifthly, the land on which it is situated should be attainable at a moderate cost, and be of such a nature that a large area may be obtained free from buildings and other obstructions.

"Sixthly, the particular spot chosen should be capable of being defended either by temporary or permanent works, and that at as moderate a cost as possible."*

Defences of the Arsenal.

The manner in which we must endeavour to provide for the security of our arsenal, cannot be treated of with any detail in this essay.

Under ordinary circumstances, we should probably employ a chain of detached forts of a permanent nature, to be supplemented in time of need by additional earthworks, so as to form the cordon of an entrenched camp which the enemy could not pass by day, and we should construct an inner line to prevent the enemy penetrating by night. The two main conditions to be fulfilled would be—

(1) The safety of the arsenal against a siege or a *coup-de-main* with the minimum of garrison.

(2) Space for an army under cover of the works, and freedom for all arms.

The circumstances of each case must, however, vary so much, that it would be useless to attempt to decide on the necessary points for consideration, viz., the strength; the distance of the detached forts from the vital point to be defended; the distance of the enceinte, from the vital point, and from the detached forts; the trace of the enceinte, profile; trace, profile and details of the forts; and these matters must be left to the requirements of each case and the skill of the engineer.

4. THE GENERAL PRINCIPLES OF THE ORGANISATION OF AN ARSENAL.

The first great principle is simplicity of arrangement.

Coequal with this, is the opposition to that over-centralisation which burdens one functionary with details which by excessive labour he cannot properly supervise in time of peace, and which must be totally neglected in time of war.

Upon these two principles hang all the rest. Economy of labour, material, and supervision; despatch of business; care of stock; excellence of manufacture; depend upon the above considerations—if by economy we mean the saving of unnecessary expenditure, and not the mere arbitrary retrenchment of expenses which must be incurred sooner or later; if by despatch of business we mean that intelligent routine which must ever be the guide for the efficient performance of numerous duties, but which in time of pressure is able to appreciate the most urgent wants of the service; if by care of stock we mean the care of it by a proper and economical subdivision of labour; and lastly, if by

* The Commission recommended Cannock Chase, in the middle of Staffordshire, and further suggested the establishment of a western arsenal at Runcorn, near Birkenhead.

excellence of construction we mean the happy union of efficiency and economy—two terms often separated widely, sometimes utterly divorced, and both susceptible of wide difference of opinion as to their true meaning.

Nothing can be more appropriate to this section of the subject, than to present a summary of the fundamental principles of administration enumerated in that remarkable work, "Responsibility in War," by the Archduke Albrecht of Austria :—

1st. To separate and define with precision the circle of action of each one in his own sphere.

2nd. To prevent a superior from encroaching on the circle of action of a subordinate.

3rd. To have as few agents as possible, but those tried men, well paid, and trusted thoroughly.

4th. To prevent the work of superior and central authority degenerating into a purely mechanical routine.

5th. To punish severely any subordinate guilty of arbitrary conduct.

6th. To return without reply, and each time with a reprimand every useless question which it is the delight of timid and idle officials to send.

In the ideal arsenal whose establishment and organisation I shall endeavour to describe, I shall assume that the arsenal is under the general authority of the Surveyor-General of the Ordnance; that it is under the direct government of a practical artillery officer of administrative ability, acquainted with stores and their manufacture; and that the subordinates are chosen from those branches of the service which can supply capable men having a knowledge of the class of stores with which they are called upon to deal.

I think few will be inclined to dispute the assertion that the manufacture and supply of warlike stores require special training; and that in addition to the knowledge required of stores in their *passive* state, the officer charged with supply should have a practical knowledge of the *use* of the same. Without this, while it is possible that a department may supply stores with regularity in time of peace, it will probably fail in time of war or emergency, because it will not know what stores should take precedence in manufacture or despatch, nor what may be supplied in lieu of those of another kind when the stock of the stores required is exhausted.

But it may be asserted that it is impossible to obtain a man practically acquainted with, and competent to deal with, all natures of stores. This is perfectly true; but an artillery officer who knows his profession, and the requirements of the other branches of the service, who has passed through the manufacturing courses, will probably be

found to best fulfil all the necessities of the case, provided he is assisted by men capable of dealing with the work to be done in a practical fashion.*

5. THE DETAILS OF THE ORGANISATION OF AN ARSENAL, DIVIDED UNDER THREE HEADS, VIZ :

- A. Storekeeping.
- B. Construction.
- C. Administration.

Under the head *A* are embraced the various stores and magazines for equipment and *matériel* of all kinds necessary for the supply of an army—the departments charged with the issue and receipt of stores, &c.

Under the head *B*, the various factories or workshops, laboratory, &c.

Under the head *C*, we may class the office portion of the establishment, through whose labours simple accounts and returns of stores, &c., are transmitted to the chief administrative and financial authorities, and the higher *personnel* of the arsenal. It will now be necessary to separate and define the subdivisions of work enumerating these, the duties and responsibilities of the subordinate *employés*, and showing the manner in which stores should be received and issued.

A. Storekeeping.

For convenience, it may be as well to name the different ranks of officials considered necessary to conduct the business of an arsenal.

The "Head of the Arsenal" may be styled *Superintendent*.

He should be assisted by specially qualified artillery officers as *Assistant-Superintendents*.

* Upon this portion of the subject the recommendations of the two committees known respectively as Lord Strathnairn's Committee on Supply and Transport, 1867, and Lord Northbrook's Committee on the Conduct of Business in the Army Departments 1870, bear very strongly.

The opinion of the former was, as is well known, in favour of a distinct Ordnance Department, and was as follows :—"That the custody and management of arms and munitions of war is so special a duty that it could not be conveniently connected with that of other supplies, but that it should be a distinct branch in close connection with the Royal Artillery, who are trained and professionally qualified for such duties."

Lord Northbrook's Committee, however, considered that this would destroy "unity of administration," and recommended that the Control Department should consist of two main sections in the War Office and in the field :—"One for providing and issuing articles required for the daily consumption of an army—such as food, forage, fuel and light, and for the administration of transport : and the other for receiving and issuing all other stores. The latter division should be placed under an officer who has a professional acquaintance with munitions of war. . . . The education and training which an artillery officer receives is precisely that required for an officer of this division of the Control Department."

The third rank should consist of men chosen from the non-commissioned grades of the artillery, or other branches of the service, or in the case of the factories from civil life, as *Depy.-Asst.-Superintendents*.

The fourth rank may be chosen as the third rank, and would perform the duties of *Storeholders*, &c., with the rank of first-class staff serjeants.

The departments and stores may be as follow :—

1. Department of Issue.
2. „ Receipt.
(To these two departments would be attached the Packing Store.)
3. Pattern Room.
4. Armoury Department.
5. Ordnance or Park, including carriages.
6. (a) Harness, Saddlery, Hors: Appointment ; (b) Accoutrements.
7. Camp Equipment.
8. Tools and Instruments, *i. e.*, those not kept in set or in regulated equipments.
9. Engineer Store, for distinct use of R. E.
10. Magazines.
11. Raw Material Store.
12. Timber Yard.
13. Breaking-up Store.
14. Unserviceable Store.

1. *Department of Issue*.—This department should be situated close to the entrance of the establishment, with capacious rooms, and large fenced enclosures and sheds attached.

The enclosure must be well drained ; and both indoors and outside the proper means for accurate weightment must exist, together with appliances such as cranes, &c., for hoisting heavy goods.

This department may conveniently be situated on the left of the general plan of buildings, looking to the front, and the Department of Receipt on the right, which arrangement will greatly facilitate the modes of egress and ingress.

In the organisation of our arsenal, we are not concerned with the method of business by which authority is primarily given for the supply of stores. The requisition may be made to meet a demand for regulated equipment, or to meet an extraordinary demand ; and upon the requisition we are required to supply, by issue from store or manufacture, as quickly and efficiently as possible, the articles therein demanded. Instances, however, must occur, when a requisition must be met without

the previous approval of superior authority. The responsibility for supply rests, in this case, with the Superintendent of the Arsenal; and it is to this authority alone, or to the Asst.-Superintendent, to whom the duty may be confided, the D.-A.-S. of the Issue Department has to look.

The method of business would be somewhat as follows :—

Requisitions and demands in the prescribed form, after registry and numbering, &c., would pass from the hands of the Superintendent or Asst.-Superintendent to the D.-A.-S. of the Issue Department, who, assisted if necessary, would enter the requisition in his *Requisition Book*.

The requisition should have attached to it a printed form with the names of the various departments of the arsenal of stores, with two columns for date and hour of receipt by the Storeholder. The requisition would then be passed to the latter functionary, who would either copy, or eliminate from the demand, the stores which come under his section, entering them in a book. The requisition would then be passed to the next Storeholder concerned, and so on. The Storeholders interested would have been named or marked off in the first instance on the printed form by the Asst.-Superintendent.

When a Storeholder has not stores to meet the demand, he would at once send in to the Asst.-Superintendent in charge of these departments a Deficiency Report, showing what stores he is unable to supply; these reports would be entered in a guard book for portability, and the Superintendent or Asst.-Superintendent would order the supply, where possible, by manufacture. And here it may be noticed that the Superintendent of an arsenal should always be in a position to execute an order *the authority for which has been given by regulation or by superior power*. The Superintendent, then, is the person who must decide the best manner, whether by manufacture or local contract, in which the demand can be satisfied. On the requisition which comes from superior authority must be shown whether unconditional supply is meant, or whether the condition is named as to the stores being in stock.

The mode of executing, &c., the orders for manufacture will be spoken of hereafter, under section B.

The stores for issue would then be brought as soon as possible to the Department of Issue. The Storeholders would be responsible that the stores were fit for issue. Some of these would be counted, where necessary, examined, and before packing the whole inspected by the Assistant Superintendent in charge of this department. This officer would be responsible generally for quantity, quality, and pattern. At the same time, it is necessary to observe that this rule, like all others, must admit of modifications. He would be, as it were, the court of appeal of the subordinate officials, who would, however, be held strictly responsible, provided they made no reference to him. Upon the nature or usefulness of this reference he would be the deciding authority.

The grand rule is *to procure efficient subordinates, and to trust them*. It is useless to devise a machinery of checks, through which it requires only a little cunning to break, and which in time of pressure necessarily falls to pieces.

The *Packing Store* should be close at hand, so that the boxes and cases required, with other materials, might be available for ready packing in the Department of Issue. The non-commissioned officer in charge would be under the orders of the D.-A.-S. of Issue. All materials and tools would be drawn in the usual way from the stores, and written off "for use;" the tools, however, being accounted for in a general secondary Store Ledger of the arsenal, containing those tools "for use," and thus separating these from the available or reserve stores.

The rules regarding packing must be founded on the nature of stores, climate, means of transit, and common sense.

The packages for despatch—classes of articles being kept separate where possible—should be marked according to those regulations which govern the marking of stores for an army in the field, the weight of the package marked, and where possible a rough list of contents. Such a system entails but little labour at the outset, and may save an immense deal to those charged with the receipt of stores.

In urgent cases, the Asst.-Superintendent should take upon himself to personally direct a necessary issue of stores; the requisition being first entered by the Storeholder supplying, and then handed over to the D.-A.-S. of the Issue Department.

The invoices should be made out by the D.-A.-S. of Issue, one copy being enclosed with the stores, the other sent to the office for transmission to the corps or department to which the stores are despatched.

As "unserviceable" stores may sometimes be ordered to be sold or broken up, the Requisition Book of the Issue Department should possess columns showing the nature of stores, whether "serviceable" or "unserviceable," and whether they have been issued for army use, or merely on "sale," or for "breaking up."

The duties of the D.-A.-S. of this department are numerous, responsible, and require a man of experience, intelligence, and method, and well acquainted with military stores.

The transit of stores to the means of conveyance—whether rail, water, or road—would be conducted by an assistant, subordinate to the D.-A.-S. in charge of the Issue Department.

There are many minor details of routine—such as the requisition being numbered by the *passing* authority, and also by the arsenal, &c., &c., but these cannot be treated of here.

2. *Department of Receipt*.—The storerooms of this department

must be adjacent to those for issue, but so separated as to prevent liability to the mixture of stores coming in and going out.

Stores received may be classed as follows :—

- (a) "Unserviceable" or obsolete stores, returned from regiments, batteries, departments.
- (b) "Serviceable," returned owing to departure of regiment, &c., or change.
- (c) Stores from factories of arsenal, or other Government factories.
- (d) Stores from contractors, to replace or complete stock.

(a) The regulations on this head are generally understood and need not here be repeated. Personal communication between the officer sending in the stores and the Asst-Superintendent will often adjust matters of difference. The tendency to call for special Boards of Survey should be checked, as the officer returning the stores and the officials of the arsenal should be mutually responsible for the correct performance of duty. It is needless to point out, what is a matter of regulation, that no stores can be condemned for mere change in pattern. No state in the world could bear the expense of continual replacement, and it should be the duty of all officers to use stores committed to their charge as their own property, and not regard the supplying department as a mere agent for drawing upon an inexhaustible source of wealth ;* while on the other hand, those departmental officers charged with supply should know the requirements of the service, and the uses of the articles the issue, so as to be able to supervise them efficiently, and have a fair judgment on those returned for receipt.

(b) Care is of course necessary that the stores of this class answer in quality and quantity to their invoices.

(c) Same remark is applicable.

(d) Stores of this class require especial attention.

In the receipt of combustible stores great care is necessary, and they must be examined in some safe place, under the special supervision of the D.-A.-S. in charge of the magazines, who would, when necessary, call in the assistance of the Laboratory.

In this department, the D.-A.-S. in charge, or his assistant, will personally superintend the unloading and opening of all packages.

The stores will then be counted, &c., and their condition, after their entry in the Receipt Book, carefully inspected and shown ; the invoice

* A really important point is correctness of " nomenclature ;" only those charged with supply of stores can appreciate the difficulties of supply when this is wanting. Full information, and drawings with specifications should be given when the article demanded is a new supply. This prevents much labour in reference.

being marked "correct" or, otherwise, so that the Asst.-Superintendent in charge may know what course to adopt. The stores will then be received over by the various Storeholders, and the invoice will be forwarded to the Asst.-Superintendent for registry in the office, and comparison with the entry in the Store Ledger, which will be made from the books of the various Storeholders. The D.-A.-S. of this department is the natural custodian of all invoices received until the stores are handed over to the Storeholders. The Storeholder receiving stores must be responsible for their proper entry in his books.

The condition of the stores would ordinarily be ascertained on receipt by the Asst.-Superintendent, assisted by the D.-A.-S. of Receipt Department, and he would decide in the case of "unserviceable" or "repairable" stores the course that should be followed; but in all cases the stores must be shown on the store Ledger as "received."

3. *Pattern Room*.—Should be in close proximity to the Issue and Receipt Departments. The patterns should be arranged according to the departments of the arsenal, so that each Storeholder should know where to look at once for any pattern. An accurate catalogue should be kept, and all drawings carefully arranged.

Attached to the Pattern room should be a small library, containing works treating of technical military matters. The officer in charge must make himself acquainted with all new stores.

4. *Armoury Department*.—This department, containing all small arms and materials for their repair, would be an extensive but simple charge. The same kind of arms should only be kept in one rack and properly labelled.

In a second-class arsenal, and where a small-arms factory is not included, it will be well to have the small arms workshops near the armoury, so that the functionary in charge, who should have been well trained in the small-arms factory, could efficiently supervise the workshops, which would, however be under the general superintendence of the officer in charge of the other arsenal workshops.

5. *Ordnance or Park Department*.—Under this head we may group:—

- (a) Ordnance, carriages, projectiles, and stores* for garrison service
- (b) Ordnance, carriages, projectiles and stores* for field service including materials for repairs supplied to batteries.
- (c) Ordnance, carriages, projectiles, and stores* for siege service.

In this department we may note the necessity for intelligent classification, for accurate tables of equipment and proportions, and that the D.-A.-S. in charge, or Storeholder, should be a practical artilleryman

* Not Ammunition.

For this department large and well drained spaces, with good sheds must be appropriated.

6. *Harness, &c., Store*, including materials for repair of the same. The Storeholder would be selected from the cavalry, or mounted branch of the artillery.

7. *Camp Equipment.*

8. *Tools and Instruments.*— This department might be in charge of a man whose turn of mind was mechanical. It would contain all tools not kept with special equipments. It would sometimes be found advantageous to add this charge to.

9. *Engineer Store*, including engineer equipments, such as pontoons, &c., not common to the other branches of the service. The Storeholder should be selected from the R. E.

10. *Magazine.*—The magazines, although forming an integral part of the administration of an arsenal, would be placed in positions of safety, consistent with facility of supply. The chief points to be attended to are :—

(1) Precautions for safety.

(2) Freedom from damp.

(3) Ventilation.

The regulations for the safety of magazines do not need repetition here, as every officer is expected to know them as contained in the Queen's Regulations.

The separation of combustible stores is an important point—*i. e.* the division of powder, which should be kept by itself, from other stores ; tubes, fuzes, cartridges (empty and filled), &c., being kept in a separate magazine. In all magazines very clear arrangement is necessary, and a list of the stores contained should always be placed on the exterior door, the quantities being inserted in a column which may be renewed from time to time by pasting over strips of paper. All cases and barrels should be legibly labelled.

In the present day, a very strong construction of magazine is required.

Projectiles, *i. e.*, shot and empty shell, have been allotted to No. 5, the Ordnance or Park Department, because it is deemed better to keep these heavy articles near the Issue Department, and divided from the combustible part of ammunition, which must be stored in a place of safety.

11. *Raw Material Store*.—For materials such as iron, copper, brass, zinc, rope, oils, paints, paper, cloths, canvas, &c., &c.—i.e., all those materials that are kept in stock to work up for use.

12. *Timber Yard*.—Under this head are embraced the duties of receiving, examining, and stacking timber. The examination prior to receipt from a contractor would be most properly performed by an officer of the Carriage Department. In a second-class arsenal this duty would be performed by one of the officers of the arsenal, assisted if necessary.

13. *Breaking up Store*.—Must be located in a safe place, and superintended by a careful man, so that the destruction of damaged or obsolete combustible stores may be attended with as little risk as possible.

14. *Unserviceable Store*.—Requires no special knowledge, and would hold stores condemned for sale or conversion.

Having thus fixed the general division of the stores, it will be necessary to make a few remarks on storehouses, and the duties of those entrusted with their management.

The buildings required for storehouses should be spacious, dry, airy, easily accessible, and connected with the Issue and Receipt Departments by tramways, for conveyance of the more bulky goods. The whole of the buildings must be enclosed, and an adequate military guard must be furnished for their protection and care. Strict precautions must be taken against fire, and the establishment frequently exercised with a view to the ready supply of water.

Storeholders are placed in positions of trust involving :—

- (1) Care over every article entrusted to them.
- (2) Habits of order, arrangement, and punctuality.
- (3) Scrupulous care in seeing that issues and receipts truly correspond to invoices and vouchers in quantity and quality.
- (4) Quickness in registry of transactions in their books.
- (5) Constant supervision to prevent deterioration, to render "repairable" stores efficient, and to bring forward for condemnation those considered "unserviceable."
- (6) Constant stock-taking.

Neatness of arrangement, cleanliness of the store, keeping together classes of articles, a proper system of labelling according to the prescribed nomenclature, care as to dryness and freedom from insects, &c., are all points for particular attention.

The multiplication of books and returns is a great evil, and they should be in printed form, condensed, and as simple as possible. Each Storeholder

should have a Division Store Ledger, showing stores classed as "serviceable," "repairable," and "unserviceable;" a Day Book showing issues, and temporary loans to other branches of the arsenal; a Requisition Book, showing copies of orders relating to the particular charge.

In all cases repairs of stores should be executed on the authority of the Storeholder, in the factories or workshops, as the labour will be more satisfactorily applied, and the method of account simplified.

B. Construction.

In a first-class arsenal, the departments for manufacture will consist of:—

1. Gun Factories.
2. Carriage Department.
3. Laboratory.
4. Small-Arms Factory.
5. Harness, &c., Factory.

The powder factory cannot be held to belong to the arsenal, though it should be situated in the zone of defence.

1. *Gun Factories.*—Any attempt to mention the machinery required, to give an account of the process of manufacture for this or that system, would extend this essay to a large volume. Only an officer practically acquainted with gun manufacture should be placed at the head of this establishment, or could hope to organise it properly. In this, as in every other branch, the great point to be attended to is the employment of good men and good machinery, arranging the buildings so that the work in the rough may be gradually elaborated, and passed on in natural order from stage to stage through all its processes.

Opinions concerning the relative merits of one system of gun construction or another can form no part of the present essay, nor would it be practicable to introduce details of manufacture.

The proof of ordnance and of powder seems to be a natural duty of this department, and the Superintendent, therefore, and his subordinates, should be qualified to use the various scientific electro-magnetic apparatus used therein. Projectiles for guns would be made in this department, which would also be required to furnish to the trade drawings and specifications, in order that Government factories might be supplemented by private enterprise in time of emergency.

2. *Carriage Department.*—Under this head it would be necessary to provide for the construction of travelling carriages for field and siege artillery, engineer and army service carriages, gun carriages for garrison service, travelling platforms, the numerous artillery machines, mortar beds, naval carriages, miscellaneous stores connected with artillery service, woodwork of saddle and pack-saddle equipment.

3. *Laboratory*.—This department must be prepared to manufacture every kind of ammunition (except projectiles for ordnance)—such as cartridges, fuzes, lubricators, wads, tubes, primers, portfires mining materiel, rockets, &c., &c.*

4. *Small-Arms Factory*.—In addition to working the extensive plant required, this department would be charged with survey of all arms received from the trade, and with the repair of all small-arms.

5. *Harness Factory, &c.*—This should include workshops for the making of accoutrements and tents. The knowledge required for the preparation of leather, &c., is peculiar, and the Superintendents would generally be drawn from civil life.

In a second-class arsenal these large factories would be replaced by workshops, for the performance of minor processes analogous to the larger operations. We should require—

- (1). A workshop containing lathes, and all machines for turning, boring, and fitting.
- (2) Smiths' shop and forges.
- (3) (a) Carpenters' and wheelers' shops, where carriages might be made and repaired; (b) Coopers' shop; (c) Painters' shop.
- (4) Collar-makers' shop, for repair of harness, tents, &c.
- (5) Laboratory, where all the simpler kinds of ammunition could be made up.
- (6) Armoury workshops, with all the lathes and tools for the repair of small-arms.

In all workshops there are certain principles which must be observed. These are: economy of material, facility of manufacture, proper application of skilled labour, and quickness in completion of work.

The charge of these workshops is so heavy that in any large arsenal it should be entrusted to an Asst.-Superintendent, well trained in the manufacture of warlike stores, assisted by a D.-A.-Superintendent, who should be a practical mechanic. Each workshop must have at its head a man responsible for discipline and work, and the prevention of idling and wastage. There should be an expense store, where the material to be worked up should be kept and accounted for. In each workshop there must be proper places for tools, to be put away at the conclusion of the day.

* One of the great necessities for this department is obviously the reduction of risk to a minimum. An account of the late trials under Capt. Majendie, R.A., with regard to maximum quantity of powder in cartridge filling sheds, distance of sheds, &c., may be found at p. 204, Vol. IX. "Proceedings of Department of Director of Artillery."

The necessary account of material must be simple in form, so that the time of those superintending manufacture may not be taken from the first objects of attention. Stores to be used in construction would be drawn in the usual manner from the storehouses of the arsenal, on the authority of the Asst.-Superintendent. The Day Book would show stores received to complete orders for work on No—Requisition, and work issued. A daily report of work executed, and workmen and material employed, would form the basis upon which the administrative department would show the cost of manufacture. An Order Book would contain the necessary copies of orders and instructions.

Spaces must be set apart for stores received and for issue to the other branches of the arsenal; and for all constructions the Asst.-Superintendent in charge must be responsible that they are according to the authorised pattern. Stores manufactured must pass through the hands of the proper Storeholder, by whom they would be delivered to the D.-A.-S. of the Issue Department, as this routine is necessary, in order that the former may know of the completion of his portion of the requisition.

The *personnel* of the workshops would consist of Asst.-Superintendent, Dep.-Asst.-Superintendent as foreman, collar-makers, carpenters, coopers, smiths, painters, engineers, armourers, wheelers, laboratory workmen, and labourers.

All labourers might be attached to this portion of the arsenal, and detailed daily for the requirements of any portion of it, so that the work may be executed wholesale, and not dispersed over the whole establishment, when it becomes impossible to supervise it efficiently.

C. Administration.

The duties of Superintendent demand an aptitude for administration and a knowledge of manufacture. An intimate technical knowledge is, however, not so necessary as the power utilising the knowledge of others in regard to details of manufacture, for the production of the best stores with the greatest practicable economy and rapidity. Knowledge of manufacture is not so much required in the administrator as a knowledge of *man*. At the same time, great manufacturing knowledge and power of administration are by no means incompatible. The Superintendent, and the officer in charge of the workshops, must ever be considering and taking counsel with their subordinates, regarding improvements which can be effected in manufacture, or in administration. Unless this be done, the whole system sink into one deep groove, from which in time of emergency it is unable to rise and seize the opportunity presented for the expansion of ideas and the development of work. The Superintendent must be a man of such tact and demeanour, that his moral power and personal influence may be brought to bear on the execution of work. It is his duty to see that everything under his control is in the highest state of efficiency, and that the stores are fit for immediate issue; that the taking of "stock" or "remains" is executed

in accordance with the rules of the service, and that this work continually progresses through the departments at regular dates.*

The Superintendent must supervise the preparation of the estimates and he must be responsible that the regulated proportions of stores are continually kept up, and the sums granted in the estimates expended as they are allotted. The application of the skilled labour at disposal; the apportionment of duties to the *personnel* consistent with the knowledge and power of individuals, or classes of men; these form part of the personal duties of the Superintendent.

By this brief summary it will be seen how varied and important are the duties of this functionary. He must be guided by ordinary rules in time of peace, and yet know how to shake himself free from the restraint of routine when he shall judge that the urgency of the case demands such a responsibility.

The duties of the Asst.-Superintendents must vary with the requirements of the arsenal. Thus, in a second-class arsenal, one might be placed in charge of all the storehouses, a second in charge of the Issue and Receipt Departments, while a third would be placed in charge of the workshops. One of them would be placed in supervision of the "interior economy" of the arsenal. Under him would come supervision of labourers in the arsenal; to him applications for leave, &c., would be made; the keeping of fine books, defaulters' book, nominal roll, &c., being performed under his orders. It might be possible to have only two Asst.-Superintendents, but in an arsenal of any size this would be impracticable.

The Depy.-Asst.-Superintendents and serjeants must be proportioned in number to the necessities of the work. In some cases the stores enumerated might be amalgamated into fewer departments, but retaining the same separation as to classes.

Circumstances must decide the number of *employes*. The wants and capacity of the arsenal can alone determine the *personnel*.

The office establishment of the arsenal should be sufficient for conducting the correspondence, collecting the returns of labour and material into such a form that audit may be rendered easy; for compilement of the Store Ledger upon the basis of the Storeholders' books, who should attend at the conclusion of the day's work; and the work will be facilitated by the Store Ledger being divided into books on printed form corresponding to the division of the arsenal.

An arsenal should form no department of account. The Store Ledger, an account of material and labour expended, with the necessary account of the wages, &c., of the *employés*, and the expenditure of cash for contingencies, should be all that ought to be demanded from such an establishment.

* In large arsenal it would be impossible to take stock of the whole of the stock at one particular time in five years, according to rule, as it would render necessary stoppage of all current work.

The Administrative Department is that which should compute the prices of stores, for it alone is in possession of all the information which can form the basis of a proper investigation. The result of any attempt to do this by a lower authority is merely empirical. The Administrative Department is that which should examine store accounts and exercise such supervision that economy and efficiency are combined, and neither sacrificed to the other; the supreme financial authority controlling the whole, through the agency of the Financial Secretary.

CONCLUDING REMARKS.

In treating this large subject, I have desired to deal with it in a practical rather than in a theoretical spirit. I might have glanced at the systems of foreign nations,* but in these matters I do not think we should gain by the imitation of a foreign model. I might have attempted to detail machinery and processes of manufacture, and essayed to describe the grand triumphs of human skill achieved in our factories; or, led away by the charms of the subject in its pictorial aspect, I might have tried to paint in words—

“The roof ribs swarth, the candent hearth,
The ruddy, lurid row
Of smiths, that stand—an ardent band—
Like men before the foe.”

I have, however, preferred to treat the subject in its most prosaic light, and have been guided by a consideration of what is most probable rather than of what is only remotely possible.

I cannot but feel how imperfectly I have treated a subject which is full of interest to artillery officers, and to those of other branches of the service who desire to rise above the immediate routine of military life. I am consoled by the reflection that no effort, however humble, can be contemned by soldiers who are seeking to perfect themselves in every branch of the art of war. We cannot all be great generals, or great administrators, but we can all try to develop our powers to the utmost, so that we may make the highest use of our respective talents, to the safety and honour of our country.

March 14, 1872.

* Those who are interested in the matter will find a complete account of the French system in Vol. 1, *Cour d'Administration "Militaire,"* by Vauchelle; and of the Prussian system some account is given in *"Die Verwaltung des Norddeutschen Bundesheeres,"* by A. Froelich, of the Prussian Intendantur.

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LECTURE.

Friday, June 27th 1873.

GENERAL SIR WILLIAM J. CODRINGTON, G. C. B., in the Chair.

ON THE BEST MODE OF DEFENCE OF THE PROTECTED TERRITORIES ON THE GOLD COAST OF AFRICA, AND THE ORGANIZATION OF A FORCE SUFFICIENT FOR THAT PURPOSE.

By Admiral the EARL OF LAUDERDALE, G. C. B.

WHEN I drew up this paper, I was under the impression that all the tribes between Cape Coast and the Ashantee frontier, were under British protection, but there have been laid before Parliament important papers relative to the state of affairs at Cape Coast, which show that before the Ashantee invasion, matters were in a very unsettled position, and from which it is difficult to make out whether there is really any protectorate at all; but as it is clear that we collect a revenue from the tribes, it appears to me that we are in honour bound to protect and assist them; otherwise I should not trouble you with this paper.

When I read, in one of the evening papers, about three months ago, that the Ashantees had invaded our Protectorate by crossing the Pra river with 12,000 men, I thought it would be a very serious affair, and in my place in the House of Lords, I urged the Government to take immediate steps to prevent supplies of arms and ammunition from getting into the hands of the enemy (the Ashantees), and to collect a sufficient force without delay, as we had, at that time, only one company (2nd West India) and a few Houssa native police to defend the eight or ten forts along the coast under the British flag, and also knowing that the tribes on the coast from the Gambia to Lagos, were in an unsettled state. I believe the great cause of discontent amongst the Fantee tribes was our handing those tribes over to the Dutch by Treaty in March, 1867, against their wish. This caused much bloodshed; but by the last Treaty of February, 1871, they are all again under our so called protectorate, but it appears they are given to understand that they must fight their own battles and that we will not protect them against the Ashantees: I am not here to discuss the policy of the Government in withdrawing all our troops from the Colonies and protected territories, but I will say this, that the force should not be withdrawn from any colony or protected territory until we are satisfied that they have organised a sufficient force to defend themselves from any impending attack.*

Before entering further into the subject, I will give an outline of the protected territory on the Gold Coast of Africa. It is bounded on the east by the Volta, on the west by the Assinee, on the south by

* Two years ago, our colony at Bathurst, River Gambia, was so unprotected that they were obliged to call in the assistance of the French.

the sea, on the north by the Ashantee territory; the River Prah being the line. Latitude 5° to 6° north, longitude 1° to 3° west. Population about 400,000; area, 14,000 square miles; sea coast about 250 miles, along which there are now ten forts under the British flag. Rivers—Volta navigable, Assinee not known, Prah, Seicoom, and several other small rivers which are fordable in the dry season. Water is scarce, except from the rivers, but can be got by sinking 10 feet. Country is level, in general covered with impassable jungle, through which all roads must be cut: there are no wheeled carriages or beasts of burden in the country: products, gold, ivory and palm oil.

The revenue in 1870 was 36,000*l.*; imports in 1871, 500,000*l.*; exports, 400,000*l.*; but I believe, it is all much increased since the Dutch Settlements were handed over to us.

The principal towns on the coast are Axim, Dix Cove, Bootry (fort) Secondee, Chama, St. George, or Elmina, Cape Coast Castle, Anamaboo, Accra, and others: the towns in the interior are shown in the map.

The climate is very hot, but considered more healthy than that of Sierra Leone. Winds, generally along the coast, from west to east; rainy season from May to August. There are also occasionally tornados and hermannans.

There is anchorage all along the coast.

The Ashantees are known to be a warlike tribe, and it is said that they are, in a considerable degree, organized into regiments or distinct bodies, under their own Officers, whom they strictly obey; they are well armed. Their mode of warfare is peculiar; they seldom attack our forces when in large numbers, but wait to be attacked, when they do not make a determined stand, but make a sham retreat, and when their enemy is drawn from their position, they turn and attack them on the flank and rear.

The Kingdom of Ashantee, North of the Gold Coast, is thus described by Sandeman in 1837:—

“Its general appearance is beautiful, many parts resembling a gentleman’s park: deer, hares, partridges, wild ducks, pigeons, &c., are plentiful, but bees and horses are scarce: it is also very rich in gold, and populous. The natives are well made, but are a barbarous and deceitful people, more inclined to be warlike than commercial; they have no written language, but are famous for making long speeches in debating on any subject. The King is a very powerful chief, he has upwards of 200,000 warriors, and has full power over the lives and liberty of all who offend him, and his authority extends over several neighbouring states; the capital is Coomassie.”

This is the fourth or fifth war we have had with the Ashantees, or rather the fourth time they have invaded the territory under our protection: the first in 1807; the second, in 1824, when Sir Charles Mac-

Carthy lost his life ; the third, in 1853 ; the fourth, in 1863, serious; and the fifth, in January, 1873, this present invasion, which was not sudden or altogether unexpected ; for early in December last year the Kings and Chiefs of the various tribes near the Ashantee frontier (the Prah river) sent urgent messages to the Administrator for help and protection against an impending attack by the Ashantees, who they declared were preparing against the Assins, Abrahs, and other nations of the protectorate ; their sons and relations came saying that the Ashantees were collecting large forces on the other side of the Prah river. No attention however was paid to them until January, when a patrol of police was sent to the frontier, who on the 30th January returned and confirmed the statement that had been made by all the Kings, and that the country was actually invaded by a large force of Ashantees ; that the Kings and Chiefs had no means of defending themselves, having no ammunition or guns. Even then, it was some time before these supplies were given them, and only in very small quantities, although the enemy was burning the villages and murdering the population of vast tract of country which they had already seized up to the 30th of a January. The King of the Assins sent to the Administrator on this date, saying: " You have sent me word that the King of Ashantee is the very " good friend of your Queen and of yourself, and that he cannot mean " war, but I tell you this is war ; the Ashantees have crossed the Prah " river and have penetrated 12 miles into my country, and have burned " nine of my villages and murdered all the inhabitants, except those " they have sent into slavery in Ashantee. I wait no longer for your " orders, but go to fight my enemy and defend my country." In short until after the battle on the 10th March, no assistance and certainly not a sufficient supply of ammunition was given to the native tribes. This, I believe, to have been the chief, if not the sole cause of their defeat, and in this I am supported by the following :—

Circular to the Foreign Ladies residing at Cape Coast Castle March 13th 1873.—" Dear friends, news having been received from the " camp of the rapid advance of the Ashantee forces invading the Pro- " tectorate States, and it being imperatively necessary that speedy and " immediate measures be adopted for repelling the invasion, the native " ladies of Cape Coast have resolved on levying amongst themselves " contributions for the purchase of munitions of war and arms, in order " to aid the fighting men in re-taking the field against the enemy, and " therefore call upon the foreign ladies residing here to lend their " pecuniary assistance according to their ability."

" £150 has been collected. The Ashantee, 30,000 strong, are within six hours' march of Cape Coast."

Up to the time of the second battle, 150 barrels of gunpowder had been given them, being only about twelve charges for each man, the force being forty thousand.

The first battle was fought on the 10th March 1873 ; the Ashantee forces are supposed to have amounted to 30,000 men armed with mus-

kets, but no artillery ; the forces of the various Chiefs and Kings under our protectorate were calculated at about the same number, *viz.*, on the right of the line first, the Buaffoos, under King Edoo ; Inkooskooma, King Essandoh ; the Assins, under their King ; to the left were the Abrahs, Anamaboos, Dankara, and part of the Assins, under King Chibbo, and Inki, one of the Kings of the Assins ; the Gomoahs—a large tribe.

The first shot fired by the enemy was against the Abrahs, who returned the fire, and continued to fight most gallantly under their king. After the first volley into the Abrahs, the enemy commenced an attack on the whole line, where they met with a stubborn resistance, and the battle raged furiously for several hours from right to left, the Ashantees being well led by their chiefs, and our forces being no less so by their Kings ; all of a sudden the firing on our right flank began to slacken, whilst that of the enemy had in no way abated ; this was caused by a panic, which had seized the Cape Coast men, who believed the enemy had outflanked them, and King Edoo, having been unable to maintain his position, had withdrawn his forces from the field. Nothing could induce the Cape Coast men to remain at their post, and they rushed back to Cape Coast bringing the news of the defeat of our forces, but such was not the case ; at that time, the Abrahs and Anamaboos and others were still fighting bravely against terrible odds, their Kings and leading men each vying with each other who should outdo the other in bravery, but, by the withdrawal of the Cape Coast men, and the retreat of King Edoo with the people of Buaffoo, our line was open to attack from rear and right, the Ashantees having taken Yancoomasie, which was the key of our position ; the Houssa force, which was in the rear, did not assist. It was now getting late, the Abrahs and Anamaboos still holding out, although nearly enveloped by the enemy, but it was all to no purpose, their *ammunition failed* them, and they were obliged to retreat, and the Ashantees pressed on and got possession of our camp ; meanwhile, as the battle was raging, part of the Assins under Inki on our right, and the remainder of the Assins and Buaffoos on our left, who had taken but a slight share in the action, had stolen into the rear of the Ashantees, and plundered their camp and carried off a number of prisoners ; this prevented the Ashantees from following up our retreating forces ; thus ended the first battle. The second battle was fought on Easter Sunday ; our forces were posted (as shown in the sketch) occupying a half circle of about ten miles ; and advanced along their war paths ; they fought well for six or seven hours ; and at first drove back the Ashantees, but their ammunition again failed them, and they were obliged to retreat, and eventually to disperse. The Houssa force of about 200 men rendered good service. On the 21st of April, the Ashantees were within a few miles of Cape Coast Castle. I believe a confederation of the tribes, under the direction and sanction of the British Government, would be the most beneficial on the whole. The late confederation was arranged without the knowledge of the protecting powers at Wankassin, Kings Edoo and Anfoo Oloo being joint King-
Presidents.

Cause of the War.—The King of Ashantee states, that being the grandson of "Ossaia Tutu," he owns Elminas to be his relatives, and consequently the Fort of Elmina with its dependencies are his. He could not understand Mr. Hennessy's message, the Administrator-in-Chief sending Mr. Plange a Dutchman, to tell him that he had taken possession of them for Quakee Fram, king of Denkera, and giving him notice that in four months time he would come and take power from him.

The King says he has been made angry by this, and it was this which led to his sending his great captains and forces to bring the King of Denkera to Coomassie, who dares to take his Elmina Fort.

The King also claims the Assins and Akims who he says are his slaves, and who have united with Denkera to take power from him, and that nothing will appease his anger, unless they and Elmina are given up to him.

Having given a short outline of the country and of the several invasions of the Ashantees, I come to the object for which I have brought this subject before the Institution, namely, how such invasions are to be prevented and resisted in future. It appears to me that, by proper organization and combination of the tribes under our protection, there would be no real difficulty in the matter; but before I go further I will venture to state that, if in the beginning of last December, when it was first known that the Ashantees were collecting a large force on the frontier, a similar movement on our side had been made, with proper arrangements for a good supply of ammunition and a force of Houssas collected and raised ready to advance if required, the invasion would probably have been checked at once. Now to be prepared to resist invasion, it appears to me the following measures should be adopted:—1st. Get a good military map of the country, or at any rate of that part of the frontier where invasion is likely to take place and near the great roads from Coomassie to the coast. Have a strong earthwork, or stockade, or entrenched camp in proper position near the frontier and commanding the roads. Let a regular plan of resistance be laid down and explained to all the tribes, particularly on the frontier, such as this:—When they first hear that the Ashantees are mustering in force on the border, the tribes nearest the point should prepare and send immediate notice to Cape Coast (possibly a line of telegraph might be laid; it is only 80 miles), and nearest tribes on each side should join them. A second stronghold should be made, say about half way in front of Yancomassie or Mansue, whichever would be the best position, where a good reserve should be stationed with plenty of spare ammunition (I am supposing hostilities had commenced). The number of fighting men in each tribe should be ascertained from time to time; the position of each tribe in the line should be clearly laid down, in case of a retreat, where they have to fall back to, which would be an earthwork or stockade, which would give them shelter and enable them to rally. A few native and one or two European instructors should be attached to each tribe, all having the

instructions from Cape Coast. The women would probably carry all stores and provisions ; they can carry great weights on their heads (see account of war in 1824, by Major Ricketts.) There are no beasts of burden in the country, nor any wheeled carriages. The tribes should be instructed that, when in position or otherwise, they should always have proper outposts and patrols to the front, so as to prevent surprise they should also organize spies or scouts. The want of this has been the cause of serious disasters.

It has been suggested that we ought to have a diplomatic agent at the Ashantee capital, Coomassie, but this I believe the (our) Government object to (see Parliamentary papers) ; perhaps they are right ; but at any rate we ought to have a trustworthy agent as near the frontier as possible, so as to insure the earliest information. Proper arrangements should be made for a supply of water ; tube-pumps would be useful as they can be taken to pieces and easily carried ; the force should have mitrailleurs or Gatlings (I believe this is by far the best description of weapon for the country, and I am supported in this opinion by all Officers to whom I have spoken on the subject), small field guns, and rockets, a good supply of trenching tools, such as the natives can use, should always be kept in store at Cape Castle. I think it an important point that, when we are in sufficient force to check the Ashantes in front, the spare tribes should always attack them on the flank and rear. This appears to me to be a question of considerable importance, for the enemy can only advance along the roads in single file, so that 40,000 men would form a line 20 miles long, which would be open to attack, the whole of that distance, by small bodies of men. It is only when they are taking a position, that they clear the jungle so as to enable them to present a large front.

The next point is, what forces should we have always ready on the spot? I believe the Houssa force is the best ; they are a Mahometan in race, from the up country near Lagos, and are known to fight well under British Officers, and can be had in any number, at least, for our wants ; they are powerful men, not affected by the climate, and cost about one-half of what any other troops would cost.* Sending European troops to operate in that country appears to me out of the question, and even the West India troops require to be acclimatized ; all this is well known from our experience in former wars. There would be no difficulty in getting European Officers to volunteer for the service by giving them adequate pay and promotion. The objections to British troops are, first, that they cannot stand the climate ; second, the length of time before they can be brought from England ; and thirdly, the great expense incurred.

The various castles could be held by a few regular troops, and in an emergency, by men landed from the ships. In most cases the forts can in some measure be protected by the long range guns from the ships. Military Officers who have been in the New Zealand or Cape

* Their pay is thirty shillings a month inclusive, but when in the field they have a ration free, or three pence a day in lieu of it.

wars, would be most valuable. There should be a large number of militia and volunteers. We are accustomed to organize or fight with savages in all parts of the world, and there can be no reason why we cannot manage and get the better of tribes on the Gold Coast. It is clear that some decided plan of defence must now be adopted ; of course it will cost money, but nothing can be done without that, and I believe the protectorate would easily pay the interest on the necessary outlay ; and when peace and security were established, they would have no difficulty in paying the capital.

This subject would have been more properly and efficiently brought before you by a military officer. I do not put this forward in any way as a matured plan, but only to hear the opinion of competent military and naval men, many of whom have served against savages both ashore and afloat in various parts of the world. These little coast wars are generally carried on by both forces combined ; I myself have been employed co-operating with the Army on the north coast of Spain, in India, and in China.

I believe there should be about a thousand Houssas, and a similar number of Militia and Volunteers, along the coast, between Sierra Leone and Lagos, ready to be collected on any one point when required, and I am under the impression that if such a force were collected, and the Cape Coast men properly organised at the present moment (rainy season), that they would be able easily to drive back the Ashantees when the season for operations commenced.

Latest accounts :—

Important message from the Camp, Cape Coast, 16th May, 1873.

Chibboo, King of Assin, Quabinah Effah, King of Akiim, and Aquasi Kaye, King of Denkera, send Prince Coffee Masu to His Excellency Colonel Harley with the following message:—

“ They acknowledge with gratitude that your Excellency has done a great deal for them in this Ashantee invasion, but they would further implore your Excellency to compel the Cape Coast people and other Fantees to go to the camp to assist them in driving their common enemy out of the protectorate.

“ If any of the tribes have offended your Excellency they humbly beg that you will not, on that account, allow them to be taken by the Ashantees.

“ They beg that your Excellency will divide the *Akbrim* people into two divisions, and send one to the camp.

“ They beg your Excellency to do all in your power to force an engagement with the Ashantees *at once*, or they will take possession of Afootoo, which is close to Denkera.

“ At present the great bulk of the Ashantee Army have moved on

"to two places called *Secebu* and *Assantee*, near to Denkera, on Monday last the 12th instant. They beg that your Excellency will write to the Accras to come and assist them.

"They beg for more ammunition, and at least 70 muskets.

"The Kings would especially beg your Excellency to compel the Cape Coast people to go to the camp at once, as they feel sure they won't move unless they are forced to do so.

"The Denkera people by their King beg your Excellency to let them have a loan of fifty Benders of gold to assist them in this war, and as soon as it over, the King will return it.

"His

"Coffee x Masu

"mark.

"Special messenger, from the

"Kings of Assin, Akim,

"and Denkera."

Dunquah, the Capital of Denkera Besieged by the whole Ashantee Army.

From accounts received late on Sunday night, it appears that the Ashantees have almost removed from Dunquah, their old camp, and concentrated their forces in the bush about five miles to the south of Dunquah.

The greatest fears are entertained that King Aquasie Kaye with his troops will be compelled to retreat, and leave his beautiful fertile country in the hands of the enemy.

Not a single Cape Coast man or Fantee has made the least attempt to go and assist this unfortunate Prince, although for the last two months, he and his brave people have been assisting the Fantees, when Yancoomassie, Dunquah and other villages were attacked by the Ashantees.

The King of Dunquah has sent to inform His Excellency that he cannot hold out much longer against the whole Ashantee Army, and must of necessity retire with the whole population of Dunquah to Cape Coast for protection, unless he can obtain similar aid to that he and his people rendered to the other Fantee tribes for the last two months or more.

Captain E. Rogers, Staff Officer of Pensioners, Longford : I was present when Captain Brackenbury delivered here a very effective lecture "On the Tactics of the Three Arms, &c.," and I was surprised

Note.—The paragraphs headed "Cause of the War," and "Latest Accounts," are taken from the *West African Herald*, Cape Coast, 17th May, 1873.

that neither he, nor any of the speakers, referred to the part that mitrailleuses are destined to play in future actions, as most countries in Europe have adopted some modification of that weapon. Russia, in particular, has organised fifty batteries, or 400 Gatling guns, and I believe they have been used in the Khivan expedition. America, too, has brought into use fifty small camel-guns for service against the Indians in the Western States. Surely, then, no scheme of tactics can possibly ignore their existence. But Captain Brackenbury confined himself to civilized contests, so to speak, and therefore the exceptional circumstances referred to in Lord Lauderdale's exhaustive paper were not contemplated by him. After very considerable study of this subject, I venture to assert that there is no gun so admirably and essentially adapted for the purpose of either attack or defence in savage warfare, as the Gatling. It is handy, light, and effective; it does the work of many men, without being subject to the endemics of pestilential Africa, and it possesses an inestimable quality in the fact that it produces an unquestionable moral effect on the strongest nerves. The Prussians who, on all other occasions never failed, did not like to face the Gatling gun, or man-mower as they called it. In fact, so thoroughly convinced am I of the effectiveness of this gun that, when the first news of any serious danger to our settlement at Cape Coast arrived, I volunteered to go there in charge of a battery of Gatlings. The Government did not accede to my proposition. Since then I have had a letter from my friend the Administrator-in-Chief, in which he says, "How I wish you were here with me in command of a battery of Gatlings." With regard to the defence of the Protectorate, I would humbly suggest, as the most feasible means of protecting our settlements in the future, to re-embody the 3rd West India Regiment: the present two West India regiments being insufficient to carry out the duties in places so far apart as the stations on the West Coast of Africa, and in the West Indies. The Houssas are very well in themselves, and Colonel Harley speaks of them in the highest terms as dashing fellows and good soldiers armed as they are with the Snider; but I venture to question the expediency of entrusting our interests to any one tribe, for they will inevitably become arrogant and self-sufficient, and will probably end in a mutiny, as befell a similar policy in the case of the Gold Coast Artillery—a local corps. Of course, the Houssa element is very desirable, but I would not employ it exclusively. It may be said that there will be some difficulty in keeping up a staff of eligible officers to properly organise the force on the spot, for it is a very delicate and difficult duty to organise these tribes, and the Officers so employed must be Europeans. That some of us are able to go through service on the coast, I may mention that I have had 14 years in the West Indies, and that I served a year and a half as Garrison Adjutant at Gambia, and my friend beside me, Colonel Ireland, has 33 years' service, of which 5 were passed on the coast of Africa; we are no bad specimens of the effect of climate! It is owing to Colonel Harley's judicious employment of Lieutenant Hopkins in command of the Houssas that the successes hitherto gained may be chiefly ascribed, for this is the first occasion on which the Fantees met

and successfully withstood their inveterate foes, the Ashantees. The only reliable system of continued resistance, is to bring the Chiefs to a united and resolute line of policy and so far Colonel Harley has certainly managed to do so, as was borne testimony to by Mr. Knatchbull-Hugessen in the House; but you must, in addition; have a nucleus, a reserve of regulars to fall back upon. The tribes should be merely regarded as outlying pickets to the main body on the coast, which, though inferior in numerical strength should be supplemented by Gatling guns to make up for disparity of numbers, a few—say four—large calibre* guns should be supplied for fort-defence, and a mixed battery of ordinary '45 Gatling and camel gun (which latter only weigh 125 pounds) for other purposes. Small guns would be invaluable in a country which you have heard described as destitute of means of locomotion, and with no beasts of burden of any kind. It is an error to suppose that Gatlings are so delicate and complicated. The locks certainly are marvels of ingenuity, but so is the lock of any ordinary rifle. Naturally our taxpayers are anxious to see the cost of Imperial assistance lessened instead of increased; but if we retain these Protectorates we must abide by the consequence, and be prepared to sacrifice our prejudices to the necessity of the case. And when all is done that can be, what remains? Our dealings with the West Coast of Africa have more or less partaken of a sentimental character, while the few that profit by our possessions there, stimulate and foster this tendency. It seems as if England's policy were at the whim and pleasure of an interested minority. Speakers both in and out of Parliament should take up this question and deal with on its merits. Let the press open its mouth and discuss the bearings of our relations on the coast, and I cannot doubt the conclusions that will be arrived at. I conclude my remarks with this sentiment: "Ireland may not be for the Irish; but for mercy's sake let Africa be for the Africans!"

MR. SWANZY: I think I can show you that our influence in Africa is not altogether that of money, but in fact that we, on the contrary, are striving to do some good. I appear here as the representative of the Fantee tribes, because I have been for many years connected with that part of the world; my brother fought and died against the Ashantees, my uncle defended the fort of Cinnamaboe, with 32 men, against the whole Ashantee army, and therefore I have a right to speak. I have been resident there six years, and I have, in fact, by far the largest trade in that part of the world. Let me first account to you for the disorganised state of the Fantee tribes. At the termination of the Macarthy war, and of the battles that followed, Mr. Maclean was sent out as President, under the direction of a committee of merchants, who managed the affairs of the West Coast of Africa in London. He went out, and by his personal influence and tact, with the assistance of £4,000 a year, he managed to extend British influence in every direction. He completely put a stop to the slave trade in that part of the world, and he extended British commerce and civilisa-

* The gun referred to is the 1-inch ten-barrel Gatling, from which 3,000 missiles can be discharged per minute when using canister cartridge.

tion in every direction. That was done without any definite law at all, without any definite granted power ; he simply used the tact which God had given him, and nothing more. I myself commanded two little forts on the Coast under him, and the only means I used at that time was to send my cap or my stick to any man guilty of any crime, and he came down and I punished him, or did what was proper in the case. Therefore much was left to ourselves, and in that way I put a stop to accusations of witchcraft and many other evils which had been prevalent on the Coast, and which were a great bar to anything like commerce and civilisation. In 1830 Mr. Maclean formed a treaty with the native tribes and the King of Ashantee, under which the whole of the tribes as far as the Prah were, so to speak, under the protectorate of the British flag ; but they then understood, as they do now, that they were to protect themselves. They were ready to protect themselves, and Governors were sent out, military men. I do not wish to depreciate military men as Governors ; in many instances, they make the most able men. Unfortunately the climate is not healthy, and therefore Governors have not been able to remain long, and, so to speak to associate themselves with the interests of the natives at all. They absorbed all the power : they took away from the native Chiefs the jurisdiction which they possessed under Maclean ; because, in my time all the Kings of the different tribes had judicial power, levied fines, and had other means of raising a revenue : but when the Governors of the Gold Coast thought proper to absorb all that power, the native Chiefs no longer had the means of raising revenue, and became like so many private individuals, without a sixpence in their pockets. That was the position in which they were when the King of Ashantee, in January 1873 crossed the Prah and came down upon them. They literally have not means enough to buy a keg of powder to defend themselves. The only great victory we have obtained over the King of Ashantee was principally fought by merchants at the head of their people, and of the different tribes, men whose names would not be known in this room ; they fought their own battles, and so they would now if they were allowed, but no, it is not allowed. I went out in 1853 myself, sent out by Sir Stephen Hill, and took charge of a force. We had no fighting, fortunately, for I am not a fighting man. But what must be the position of men in this state ? They have no means of fighting, no organisation whatever ; the power of the Chiefs is no longer acknowledged by the people, and the Government would not allow them to take any part. The moment war breaks out, the Governor sits down in the Castle and says—"Gentlemen, I am ordered by Her Majesty's Government not to assist you in the slightest way." After a great deal of intercession on the part of the natives and merchants, he serves them out not 150 barrels of powder at one time, but, by dribblets, 10, 15, 20, barrels of powder at a time. Why, I have nearly given out as much myself on my own private account. It is a miserable thing, a case of £450 at the very outside. Her Majesty's Government say it was necessary that Colonel Harley should retain sufficient ammunition in the forts to defend them. Why, 32 men defended a fort, in 1807

against the whole Ashantee body. They cannot take an English fort there under any circumstances. Moreover, there are vessels of the Fleet lying stationed all along the coast who would blow them to atoms in no time. As far as ammunition is concerned and the necessity of saving it, there were plenty of ships full of gunpowder there, had His Excellency chosen to buy it. That has been the great mistake. Colonel Harley has not backed up the men sufficiently. Lieutenant Hopkins and three or four English men only, did everything; it is to them that is owing at the present moment the safety of Cape Coast Castle,—to Dr. Rowe and Dr. McKellah, and two Officers of the Houssa police. Now, they have plenty of force; but what has happened in the mean time? The whole country is devastated in all directions, and thousands of poor creatures have been dragged away to slavery or to butchery in the interior. A friend of mine at Bristol, Mr. King, a well known merchant said to me, "I hate to see Her Majesty's flag flying on the coast. Give me a native chief and I can trade, I know what I am doing; but give me Her Majesty's flag and I do not know what I am doing." The revenue of that part of the world is not less than £40,000 to £50,000, and that might be raised to £100,000 which would be ample not only to maintain the safety of the settlements, but to spread their influence into the interior. I do feel deeply on this point, and I am much obliged to your Lordship for speaking on this matter. Your Lordship made use of the word "defection" on the part of the natives. Your Lordship is quite right, there are three great tribes who themselves are able to cope with Ashantee, if they are united, the Dunkras, the Akims, and the Assins, who were formerly under the Ashantee dominion; any one of these three great tribes could cope with the king of Ashantee. It is not easy to fight a large body of men in a country like that; a small body of men is amply sufficient. The fact is, it was the total want of organization on the part of the natives that led to this disaster. It is the taking away the power they formerly possessed, and then, when the crisis comes, doing nothing to assist them, that has been the cause of it all. I took the liberty of speaking to the gentlemen at the Colonial Office, and suggested the necessity of sending out provisions; because, it is very clear, that famine will ensue. April is the month for planting, and, owing to the disturbances this year, a large portion of the country will not be cultivated. The Government have since done very well, in fact, ever since your Lordship's observations in the House of Lords, and since they have ascertained what has taken place and the reality of this invasion, they have done all they possibly could, to mend matters. In the meantime they were deceived. Colonel Harley estimated the number of the Ashantees at something like 4,000. Mr. Pope Hennessey did the same. He thought it was a mere raid, and he told me also it is customary for the King of Ashantee to break his staff as a declaration of war; and then the Ambassador is sent back and war commences. In this case he had the advantage of surprise; and our own people are not allowed the advantage of surprise. I must thank your Lordship before I sit down for the interest you take in this matter. I have myself contributed something towards scientific discovery in Africa. I take more

interest in Africa than that of the mere question of trading. Every proper-minded merchant does so; he does not think only of pounds, shillings, and pence. You, gentlemen, do not, I know, in your profession; and why should you accuse us of anything like that? It is perfectly true that, in old times, when the Slave Trade was prevalent there, we had the strongest sympathies of the British public. That time has passed away, and we are now left to ourselves and are told we must provide for ourselves. We are thankful to be allowed to do so. The cause of the last Ashantee War has been mentioned. In addition to Elmina, among other things the King of Ashantee wished to get back these tribes, the Dunkras, Akims, and the Assins to his power, for they formed part of the Ashantee tribes. I think the estimate of your Lordship is right—that they number something like 40,000.

Major KNOLLYS, Garrison Instructor, Home District: Before commencing I must apologise for presuming to take up your time. I have never been on the coast myself, and have no personal experience; but ever since this Ashantee war has begun, I have followed its course with the greatest interest, and have had further the advantage of reading a vast number of letters from the coast, and of personal interviews with a great many people of considerable experience. It has always struck me as a very singular circumstance that we take so little notice in England, of the Coast of Africa. The aggregate of imports and exports, according to the last returns being about two and a-half millions, or equal to that of Jamaica. I have every reason to think, from the different returns I have seen, and the opinions I have read, that that is capable of being enormously extended. My own opinion is that we have only just tapped the surface of the outside of Africa, and that it is capable of a development which will surprise even those who are best acquainted with the subject. As to the cause of the war, I understood in addition to the money paid by the Dutch to the Ashantees for Elmina under whatever form it was—whether a complimentary payment, or whether they chose to interpret it as a tribute—that there was another reason, which was, that the Dutch used to pay the King of Ashantee so much per head for slaves, whom they employed as troops in their other colonies; and by that being put an end to, the King of Ashantee lost a very considerable amount of revenue. With reference to the Protectorate, I must say I think we have behaved in a most cruel way to the Fantees. We have treated them just as if we had tied their hands, put them in front of a powerful foe, and then said, “You must defend yourselves.” There had been, originally, a confederation; and, two years ago, the Fantees endeavoured to revive it. They went rather far before applying to the Administrator, for they had actually appointed an Officer, and drawn up a Constitution. The authorities were indignant that matters had gone so far, without their leave being asked; and they did not encourage the movement. The recommendation of the Committee was that they should be encouraged to defend themselves as far as possible. In spite of that, as soon as ever they took their first step towards it, merely on account of a breach of etiquette, they were immediately sat upon by the Administrator, and five of them

committed to prison on a charge of high treason. His acts were said to be repudiated by the Colonial Office and by the Governor-in-Chief afterwards ; but they were repudiated in a very mild way, The tribes were put off from time to time. The last scheme they submitted was six months without receiving any attention, and then came the Ashantee War. It seems to me that our prestige and honour has been very seriously compromised. One of the great complaints of the merchants—native and European—on the coast in the different stations in the protected territory is, that they are not given to understand how far the ægis of the British protection extends. One Governor interprets it within shot of the guns of the different ports, and that is all that he will undertake to defend. Another extends it for two or three miles. But while there is this inconsistency with regard to protection, there is none whatever with regard to taxation. I understand that while they are not at all ready to defend the commercial interests of merchants at a distance, they take uncommonly good care to collect their revenue. There was one case that I read in the *Manchester Courier* the other day. A gentleman said there was a settlement on the Volta where a tax-collector came round to collect revenue duties on the imports ; and there was a tribe on the other side of the river whom we had, in vain, endeavoured to bring under our rule, and who refused to be taxed. They stopped all commerce in the river, and attacked and burned the station, destroying a large amount of property belonging to native and European merchants. Application was made to the Administrator for redress ; but he refused to give it. The merchants said “we pay taxes and are entitled to protection.” No, he said, “Her Majesty’s Government will not undertake “to defend those people who are trading at a great distance, and if they “continue to trade at that distance, they must do so at their own risk.” Upon which, they put the question to the Administrator as to what was considered an out-of-the-way place, and how far the protection of the British Government would extend. The answer he gave was, that was a question to be asked him by superiors, and not by individuals. That caused a great deal of indignation on the part of everybody on the Coast—both Fantees and Europeans, and it was said that it was ridiculous to talk about it being a protected State, because it was not we who protected the Fantees, but the Fantees who protected us. And if it had not been for the Fantees the other day, the Administrator would have been shut up in Cape Coast Castle. With reference to the method of defending this district, I have understood from reports of different Officers on the Coast, that neither British nor West India regiments can be employed with advantage in the interior—that their health will not stand it ; and I am told that the only force to rely upon are the Houssas, which already exist. They were started by Captain Glover, the late Governor of Lagos, and numbered 350 men, 300 being armed with Sniders, and the remainder trained to work artillery. They are excessively well disciplined and well-trained men, and have already done good service in these countries. In the first action there was a body of 120, some few miles in rear of the Fantee forces. They were restrained by the instructions of the Administrator from giving any but

moral support ; but that moral support was not of much use, and the Fantees had to run away. On the second occasion they did uncommonly good service, and lost about 16 men out of the 120, killed and wounded. The danger alluded to of risking all our strength and putting all our trust in one tribe is, I think, a little overrated. The circumstances are not quite the same as in India, nor with regard to the Gold Coast Artillery Corps alluded to, for the Houssas would be serving out of their own district, and therefore you might rely upon them. They have never given any sign of insubordination ; in fact, ever since their formation they have given their superiors the very greatest satisfaction. Capt. Glover was very anxious to increase this force, and, had he been allowed to do so, there would have been a very powerful body of men under their commandant, who was an officer in the British Army, and served with distinction in the Siege of Lucknow, Mr. Goldsworthy. If he had been able to bring some 500 of these men to meet the Ashantees on their first invasion, I have no doubt the issue of the first battle would have been very different. With regard to the estimate of numbers ; the numbers have been estimated very largely indeed ; and I believe that is explained by the fact that for every fighting man in the Ashantee force, there is a camp follower ; therefore you may take half the number of men given as about the fighting force. The total number being given at 80,000, the fighting force would be 40,000. With reference to the future defence of the country ; there is this objection to stockades, that if the tribes had to retire and to take refuge in them, they would be obliged to bring their women and children with them ; therefore, I should imagine, instead of erecting these stockades outside villages, it would be the best thing to fortify the villages themselves. This, however, is only a matter of detail ; the principle is exactly the same. The main point seems to me to be that we should assume the offensive ; the Ashantees have never yet been thoroughly threshed, indeed they have always had sufficient reason to think it was quite doubtful whether they licked us, or we them. I cannot help thinking if we were to make up our minds to finish the business and go into the Ashantee country, it would save us a very large amount of money in the long run, and no doubt would largely increase our prestige on the Coast, and render the danger of future wars very trifling.

Commander VERNEY, R. N. : Just three years ago I was about to embark for the West Coast of Africa, and on landing in England this morning, after an absence of three years, I saw at the Admiralty a notice of Lord Lauderdale's lecture. The enjoyment of two years in the Mediterranean has not effaced from my mind the miseries of the months on the West Coast of Africa ; and since I have been there, a thought has often arisen in my mind as to what extent it is the duty of Englishmen to be employed on that coast at all ? If there is any question of duty, English Officers are ready to go at any expenditure of life and amount of suffering. But I have failed to see where there is any call of duty to Englishmen from the West Coast of Africa. It seems to me, before we consider the subject of how one is to protec-

such a great extent of country, the question should first arise whether it is our duty to do so at all. Lord Lauderdale drew an analogy between our reducing our forces in a colony and reducing our forces in a Protectorate ! it seems to me there is no analogy at all there. We have a duty to our Colonies, but what duty have we on the West Coast of Africa ? What duty have we to protect that large extent of country ? Who wants us to protect it ? The natives do not want us to protect it. The merchants do not want us to protect them. The gentleman who spoke just now (Mr. Swanzy) told us he does not want our protection, and that they can get on better without it. What is the nature of the protection we have afforded ? we have afforded no protection whatever to these people. This very war goes to prove the case that we are quite unable to protect them. Then, what have those who have served on that coast suffered ? How have people returned from the coast ? Utterly broken in health, utterly useless for their profession hereafter merely through service on that desolate and abominable coast. In some of our colonies, for instance in British Columbia, there are parts of the country where the merchants are told that, if they chose to go and trade, they shall receive British protection, but if they chose to go to other places they must protect themselves. There you have either the one thing or the other. Either the British flag is there and is able to defend itself, or else you are told you must defend yourselves if you want to go and trade in the wilder parts. Why cannot the same thing be done on the West Coast of Africa ? It seemss to me it would be perfectly feasible that there should be certain parts of the Coast, such as Cape Coast Castle, where British law and justice should reign, and that if the merchants choose to go and trade in other parts, they must do so at their own risk. How is it possible for us to protect the whole of that great tract of country because, practically, our protectorate goes up beyond Fernando Po. (Lord LAUDERDALE: Our protectorate merely extends between the two rivers Volta and Assinee.) But the red line on the map extends into the Bight of Beuin it extends up to Lagos, and there is a large extent of country which I venture to say it is quite impossible for us to protect. No gentleman has yet suggested that view of the case. and I shall be glad to hear, if any one will condescend to do so, how it strikes any gentleman present that it is our duty to extend the light and help that we at present afford on that coast. The very day that we left the coast in the "Growler" there came off a poisonous wind from the shore, the worst that I have ever experienced, and two days afterwards quite a third of the ship's company were laid up with fever. By the mails that we received shortly afterwards we heard of several deaths that had occurred from this poisonous wind that came off on the very day we left that pestilential coast. I should be very sorry to think that any officer was sent out to organize troops there, or to carry on operations in the interior, unless it was first made perfectly clear that it was our duty to maintain our protectorate over so large a portion of the coast.

Captain BEAMISH R. N. : I came here quite unprepared with any

observations on the subject. We cannot but thank Lord Lauderdale for bringing this subject—so very much connected with British prestige—not only before Parliament, but also before those who are able to speak upon it. I do not agree with the gallant Officer behind me (Captain Verney) as to our protectorate, particularly from the point of view in which he regards it. I think, however, that what is called our protectorate there might better be called a confederation. I think we have taken the heart out of these fine tribes in that part of the world. We have not allowed them to have very much to say for themselves, and then, when they are in the lurch, we are not able to help them. I do not think we can defend that part of the world by any means, and in that way I agree with Captain Verney, and I think it preposterous that we should attempt to do so with Europeans. A gentleman on my left, who spoke about the Houssas, spoke extremely to the point. Captain Glover, who has lately returned from that part of the world,—one of the most valuable man who has worked out there for a large number of years, certainly one of the most energetic and far seeing,—I won't say the inventor of Lagos, and certainly the inventor of the Houssas, got rather snubbed for a good many things connected with these Houssas, but he has carried on his views, and the Houssas have been found to be invaluable. I do not see any danger that can arise from their employment. They are Mahommedans, and are therefore more civilized than the natives of the coast, and are very much tied together in consequence. I think they might be made to form a part of, if not the regular Army, of that protectorate or confederation as well as at Lagos. Let us try the experiment, if you please, all along from Cape Palmas to Fernando Po. With regard to having small fortifications, I think perhaps some of the natives near the forts might be taught to fortify their villages; but if we are to do anything in the way of fortification for protecting our coast, we should have them within a circuit of a very few miles, and, if necessary, it might be done with small earth works. I think, perhaps, the Gatling gun would be too difficult for the natives to work; but I am quite confident the Houssas and others might be very well taught to work small mountain-guns or camel-guns. Our prestige on the coast of Africa has gone down extraordinarily. We have put a stop to slavery, and the result is now we are not holding up our heads, and judging by what I can read and from what I saw when I was out on the coast some years ago for 3½ years, I feel this about it, that nothing can possibly be more wrong than the uncertain state in which we leave these unhappy natives as to protectorate, confederation and so forth. I think we should let them understand that we have a very small belt round our sea-port which we absolutely will defend to the death; but that we will help them with ammunition and occasionally with money, and with military tuition to keep up the confederation I spoke of. And I would go so far as to flatter the great Kings and Chiefs by giving them at least something to say in the assembly or council in the large main towns at the head of the confederation. If these men are left outside in the cold till some one comes and attacks them, and are not allowed to combine together without getting into a

scrape for it, the chances are, our prestige must go, and before the public know it, we shall have the whole country covered with blood (as it really has been for a long time) and entirely devastated, unhappy children carried into slavery, and nearly all the old people slaughtered. I think what would be a useful thing (and I do not know that such a thing exists on that part of the coast) would be that each protectorate should have provided for it a very small steamer, not necessarily a man-of-war, but one possibly belonging to the colony. It could lie with very great safety off Cape Coast Castle, and it might move about from one part to another for the purpose of carrying supplies, and enabling the Governor to visit the different parts under his protection.

Colonel YONGE, late 1st West India Regiment: When I went out to take the command of the troops on the West Coast, my command reached from Gambia to Lagos, and then they made me an Administrator-in-chief. I know Colonel Harley and Captain Glover, and I heard the name of that gentleman long ago—he is bearing a high character in that part of the world—but we are not allowed to assist each other. If they choose to protect the base, it can be done easily enough; but I do not see that any gentleman yet has replied to your Lordship's question—which is the best way of protecting this part of the world? My idea is, if they intend to do it, that they should have a couple of thousand men well officered and well commanded, and who should not be sent out against their will, but should be volunteers, and you will find more than 2,000 men who would be willing to go. They ought to be well paid for it, it is very hard times that men should be serving there and scarcely be able to live. I was utterly astounded when I went back, to discover that it had been proposed that our canteen should be taxed. Are we not only to pay in person but also in purse? I was delighted, however, to find that such a sum of money would be allowed to each Officer as would counteract the attempt made to put a tax on what we had. When Mr. Monsell was the Under Colonial Secretary, I said to him, "Now, Sir, I seek the appointment as Governor-in-Chief of that place, and if you, having appointed me, were to ask me to-morrow what I thought about it, I should say, 'remove us all away, both civil and military.'" I know very well how the merchants thrive there. Look at Lagos; look at Benin. I was there, and there they are more prosperous than we are where we have our own forces, at Sierra Leone. I asked Mr. Monsell what good it could be to the merchants of England to be charging them on imports and exports to the amount of £50,000 a year. I therefore agree in saying that I do not think we have any business there; but if you intend to protect those States, do it effectually, for it is a great shame that we should mislead these people and pretend to protect them when we do not. I think 2,000 volunteers, well paid, with four of Her Majesty's ships working down the coast, would do the work. These ships might go to the Canaries, to Teneriffe, here and there, even to that beautiful island of Fernando Po, where fellows, can go to amuse themselves and recruit. Then you must have good weapons, if you are going to do it

at all. When I went to Sierra Leone, the first thing I did was to go to an old friend of mine, then Deputy Adjutant-General. I said, "I am going to Sierra Leone, and I am entitled to have the very best weapons you can give me. He said, "You are right." I had no occasion to use them, but I showed the natives the effect of them and it prevented their going to war with the French up the rivers. I was then Administrator-in-Chief, and they came to me and threatened war. I said, "Nonsense, if you are wronged, appeal to the justice of the Emperor, but don't you go to war with them, or you will be eaten up," and I showed them the effect of these guns. The giving me those guns brought honour to our country; for it so happened that by their use 40 men turned aside some thing like 500 men in the Orange country. A young gentleman came to me with a letter of introduction, and asked for the guns. He used them successfully on that river, and I am delighted to say he has been promoted from a subaltern to a Captain for his good service—a most unheard of occurrence.

Mr. LAW : I was on the Coast last year, and with reference to the question how we are to attack Ashantee, my idea is that we should go up the Volta. I have been up the Volta with the late Captain-Governor Administrator Sabar. We steamed 120 miles. It has not been thoroughly surveyed. Captain Glover led an expedition in the year 1870, but they had a good deal of fighting, and there were 300 or 400 men killed. We can steam up the Volta within 60 miles of Ashantee. It is a beautiful open country, with large plains and immense trees. If we attempt to go up as we did originally in the expeditions of 1862 and 1865, to cross the Prah and go up there, it is next to impossible, because the pathway is so narrow that the men have to go up in single file, and it is next to impossible to take a great force up; but if the Volta is explored I think we can do it. There is only one fort at Cape Coast Castle, Fort William, which is of any use. There is another fort there, but it is of no use whatever; it is a mere outwork. But there are other hills on which forts can easily be placed. At Elmina, there is the best fort that we have on the Coast, and the guns are the best guns; ours at Cape Coast are not to be compared to them in fact our guns are old and useless, both at Cape Coast Castle and Fort William. Another error that I noticed, my Lord, is with regard to the rifles supplied to the natives out there. All the natives have been able to purchase the Snider rifle since August 1870. I have seen them myself sold in the different stores by merchants, with 100 rounds of ammunition, for £3. Major Rose was with me at the time, and remarked it. I said, "I am astonished at this; what can we do?" I may also say as to the cause of the war, I believe the Dutch have always paid a fief to the King of Ashantee; and not only that, but I believe it is a fact that they had paid so much for every slave. Another thing that has brought on this war is that the King of Ashantee thought he could cope with us, and he had very good reason for thinking so, for his uncle was allowed to overrun our territory in Chopo and to commit unheard of atrocities. He ought to have been put to death.

the moment we seized him ; but no, he was sent out, and allowed to pass free and unmolested. As to the ammunition, I have heard that the ammunition supplied to the Fantees was in great measure bad, and I have every reason to believe it, because I have seen it. Our ammunition that we had there had been there for years, a great deal of it. Hundreds of barrels were more or less damp, and I believe they were supplied with this ammunition.

Rear-Admiral Sir JOHN HAY : Can you inform us what was the draught of the steamer in which you went up the Volta ?

Mr. LAW : I went up in the "Nelly ;" I think she drew 6 feet.

The Earl of LAUDERDALE : In replying to the remarks which have been made during the discussion, I would say that four men will carry a Gatling gun quite easily, and the carriage can be carried by four more, while the ammunition may be carried by any number behind. I do not see any objection to the West India regiments, only I believe that these Houssas, whom you get on the spot, and who are acclimatised would be the best. Captain Rogers also referred to a reserve of regulars ; does he mean reserve of the West India regiments ? (Captain ROGERS : A reserve of the West India regiments.) Mr. Swanzy spoke of the famine that is certain to ensue. I am quite aware that that is a most serious point. These four tribes are now losing the season for sowing their crops, and they will be starving. There is no doubt that the Government will have to send out provisions. He also remarked that our Government underrated the numbers of the Ashantees, and I believe that to be perfectly correct. I have no doubt you can get up the Volta, but that is the only river, and it is rather a roundabout way. I am quite aware that the ammunition supplied to the Fantees was bad. With reference to Captain Beamish's remark that we could not defend the whole coast, the territory I am alluding to is only that between the Volta and the Assinee, the whole length being 250 miles. It is said that the proper plan of organizing these tribes would be confederation. A confederation has already been tried, and it is approved of by our Government. The tribes did form a confederation, and laid down rules and constructed their Government, but they had done it without the sanction of the British Government, and the British Government threw it over. Not only that, but they put the Leading men in prison. Still I quite agree that the confederation would be one of the first steps, but it must be a confederation under the sanction of the British Government. I think another gentleman said that he did not agree with me about a protected territory, and that it is very different from a colony. I do not see the great difference between a territory properly protected by the British flag and a British colony. Perhaps he is aware that the Ionian Islands which we held for so many years, were not a British colony ; but were nothing more than a protected territory. They had their own Government formed for them by us ; but if any nation attempted to look at the Ionian Islands, while we held them, or attempted to hold up a finger to go that way, why we should have defended it to the last

man we had. We laid out thousands of pounds in building fortifications ; this was nothing more than really protected territory ; and when we take it upon ourselves to protect any territory ; to say that we will protect them, to give the name of the British Government, and to allow our flag to be hoisted, I consider that we are quite as involved in protecting them, as if it was one of our colonies. Colonel Yonge gave us very valuable information. He thinks that the people that are not under our flag are more prosperous than those that are. That is not a question that I enter into. So long as we have protected territories we are bound to protect them. One of the objections to the confederacy was, that of course you can not have a Government without taxing the people to pay your Government, and then as we tax them again, these poor unfortunate people would be doubly taxed. If there is any confederation, we must be at the head of it, so that there shall only be one taxation.

The CHAIRMAN : I think I may safely ask the meeting and the Institution to give their best thanks to Lord Lauderdale, for his kindness in coming here. The subject is one of great interest, and Lord Lauderdale has taken it under his protection, and has ventilated it very well. We must also thank those gentlemen who have kindly taken part in this discussion.—*Journal No. LXXIV of the Royal U. S. Institution.*

INVENTION.

GUN CARRIAGE WITH PNEUMATIC ELEVATING GEAR,

DESIGNED BY CAPTAIN JAMES B. EADS, ST. LOUIS, U.S.A.

CAPTAIN JAMES B. EADS whose name is best known in connexion with the great engineering work he is now successfully bringing to a conclusion—the railway and road bridge over the Mississippi at St. Louis—has recently designed a gun carriage for working guns *en barbette*, and in which the force of recoil, and the weight of the gun, are employed to compress air in a suitably designed receiver, where it is stored up until the gun is to be elevated. Working models of this carriage, the arrangement of which we shall proceed to describe, have been tested at Washington with success, both as to their efficiency in rising and falling, and also as to their capacity for remaining depressed for prolonged periods without losing the power necessary again to raise the gun.

The drawings which we publish illustrating this carriage, are taken from a working model for a 15-in. United States army gun, and made one twelfth of the full size; the total fall of the gun in the model is 10 in. representing a depression of 10 ft. in the actual piece.

The action of the carriage is dependent simply upon the compression of air in a receiver, effected by the downward motion of the gun, transferred to a piston rod and leatherpacked piston, which works to and fro in a cylinder open at one end. Water or glycerine is admitted behind the piston in order to maintain a tight joint, and in sufficient quantity to fill the space between the end of the cylinder and the piston when the gun is in its lowest position. The quantity of water would be varied with the powder charges employed; with heavy charges the quantity of water is increased, in order to produce a greater degree of compression of the air.

The chief features in the details of the carriage, which we now proceed to describe with reference to the drawings, are the elevating and depressing gear for training the gun, the arrangement for retaining the gun when down, against the force of the air compressed in the reservoir, and the friction gear.

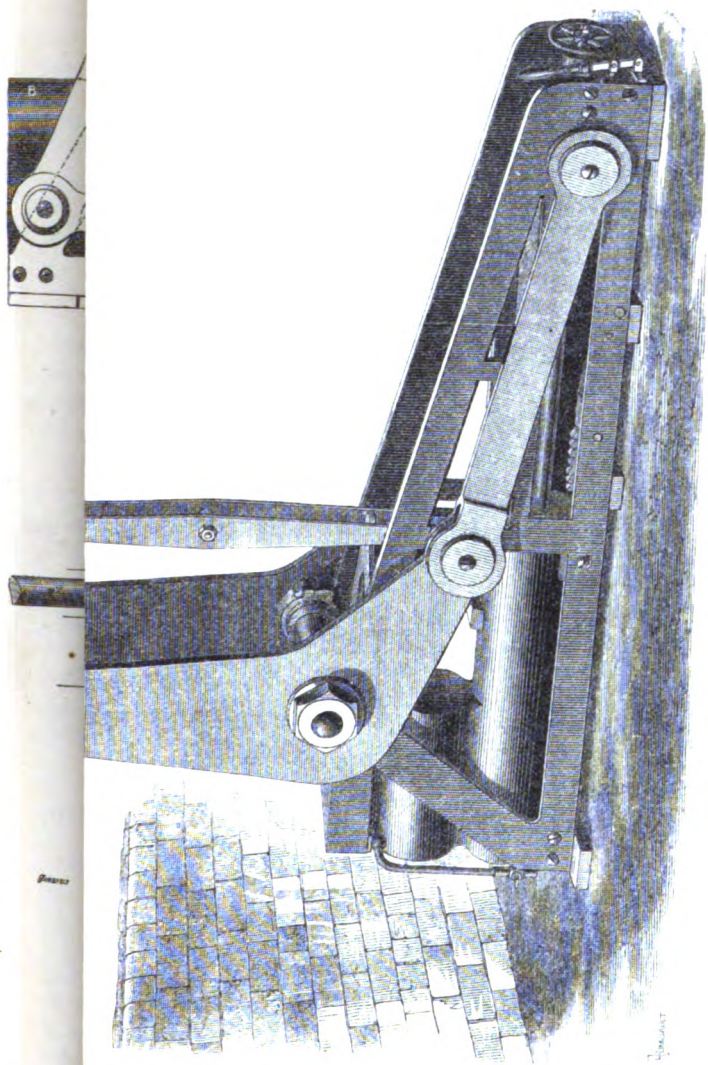
The engravings upon the opposite and present pages will fully explain the construction of the carriage. Figs. 1 and 2 show the gun after recoil in the loading position beneath the parapet, whilst the perspective drawing on the opposite and present pages shows the gun above the parapet ready for discharging. The other figures represent complete details, and in all of them similar letters of reference are employed. A is cylinder, B is the air chamber, C is an inlet closed with a screw plug for introducing water, D to M show parts of the arrangement for retaining the gun when in the loading position, NN are connecting rods for elevating and depressing the gun before firing, and also for preserving its horizontal position when in the act of descent; O is a

nut on the elevating screw, jointed to the rods, NN; P is a friction plug fitting into the wood-lined socket, S, in the crosshead, R, which is attached to the piston rod, X, and connecting strap, U; these straps are jointed to the lower ends of the levers, TT, which sustain the gun; V is the gun-carriage frame.

It will be seen that by the peculiar action of the elevating levers, NN, and the nut O, the plane of the gun varies but little when the gun is in its lowest position. The piece when down has, however, always a slight elevation, which facilitates the rolling in of the shot, and this elevation is maintained, no matter what elevation or depression it may have given to it by the screw when trained for firing. This will be apparent from Fig. 1, where it will be seen that raising or lowering the nut, O, on the screw will not sensibly alter the horizontal position of the piece; but when the gun is up, as in the perspective view, the case is quite different. By the arrangement adopted, the piece is always thus brought to rest in the same position, no matter how many degrees of elevation or depression be given it for firing.

The force developed by the recoil and fall of the gun is much greater than is required to bring it back to the elevation from which it falls. A part of this force is however, given off by the cylinder and piston in the form of heat, otherwise the gun would be thrown up with great force; part of the force is also converted into heat in compressing the air in the cylinder, and as this heat is quickly absorbed the latter is incapable of expanding to its original volume, when the gun is thrown up. Hence the latter part of the stroke of the piston is made against an external atmospheric pressure, and tends to bring the gun gradually to rest as it rises above the parapet. If the gun is not down long enough for this heat to be lost it comes up with greater energy. To equalise any differences of air pressure and also to prevent counter recoil, which would ensue if elastic buffers were used, and thus probably cause the gun to fall after it came up and before firing, the friction plug, P, Fig. 1 and 5, is, secured to the rear of the carriage, and enters a corresponding socket, S, in the crosshead, R, Fig. 5. This socket is lined with wood, and the plug can be advanced or withdrawn by the screw and wheel, Q, Figs. 1 2, 3, and 5, according to the amount of resistance found desirable to check the gun. When the plug enters the socket the gun is securely retained until it is loaded, and ready to be raised. This insures the cylinder being filled with air, and prevents the possibility of a vacuum after the gun is up.

The gun when thrown down is held against the reactive force of the air by a peculiarly arranged pawl and ratchet gear shown in Figs. 4, 5, 6, 7. The ratchet is fastened to the underside of the crosshead, with teeth inverted, and the pawl D is retained in its upward position by a spring (Figs. 4, 5). As the great strain sustained by the pawl in holding the piston from coming forward while the gun is behind the parapet would soon destroy its teeth by excessive friction if they were disengaged whilst the pressure remained upon them, an arrangement

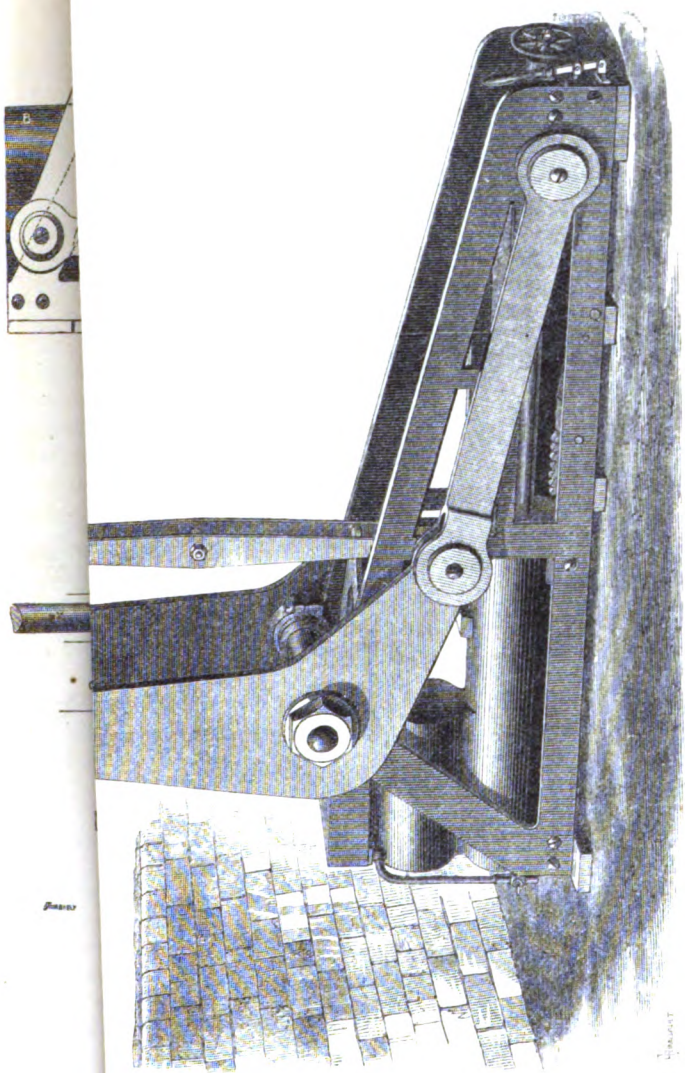


nut on the elevating screw, jointed to the rods, NN; P is a friction plug fitting into the wood-lined socket, S, in the crosshead, R, which is attached to the piston rod, X, and connecting strap, U; these straps are jointed to the lower ends of the levers, TT, which sustain the gun; V is the gun-carriage frame.

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The force developed by the recoil and fall of the gun is much greater than is required to bring it back to the elevation from which it falls. A part of this force is however, given off by the cylinder and piston in the form of heat, otherwise the gun would be thrown up with great force; part of the force is also converted into heat in compressing the air in the cylinder, and as this heat is quickly absorbed the latter is incapable of expanding to its original volume, when the gun is thrown up. Hence the latter part of the stroke of the piston is made against an external atmospheric pressure, and tends to bring the gun gradually to rest as it rises above the parapet. If the gun is not down long enough for this heat to be lost it comes up with greater energy. To equalise any differences of air pressure and also to prevent counter recoil, which would ensue if elastic buffers were used, and thus probably cause the gun to fall after it came up and before firing, the friction plug, P, Fig. 1 and 5, is, secured to the rear of the carriage, and enters a corresponding socket, S, in the crosshead, R, Fig. 5. This socket is lined with wood, and the plug can be advanced or withdrawn by the screw and wheel, Q, Figs. 1 2, 3, and 5, according to the amount of resistance found desirable to check the gun. When the plug enters the socket the gun is securely retained until it is loaded, and ready to be raised. This insures the cylinder being filled with air, and prevents the possibility of a vacuum after the gun is up.

The gun when thrown down is held against the reactive force of the air by a peculiarly arranged pawl and ratchet gear shown in Figs. 4, 5, 6, 7. The ratchet is fastened to the underside of the crosshead, with teeth inverted, and the pawl D is retained in its upward position by a spring (Figs. 4, 5). As the great strain sustained by the pawl in holding the piston from coming forward while the gun is behind the parapet would soon destroy its teeth by excessive friction if they were disengaged whilst the pressure remained upon them, an arrangement



is adopted first to release the pawl from all strain by allowing it to move back with the crosshead at the commencement of the stroke, and at the same time to throw it downwards, and so completely disengage it from the ratchet. This is shown especially in Fig. 5. The pawl, D, Fig. 4 is prevented from moving back, by the bar, E, and the crank, F, moving on the shaft, H, when the crank, is at its dead point with reference to E, and the strain is resisted by the shaft H. A knuckle joint is thus formed by the bar, E, and the crank, F; when this joint is thrown upwards as in Fig. 5 by a rotation of 40 or 50 deg. of the crank, all support for the pawl is suddenly withdrawn and it comes back with the bar, E. A pin, J, passes through the pawl at the intended end of it, and serves as a check to prevent it from rising higher than is necessary to engage the teeth of the ratchet, and also to insure the disengagement of the teeth by drawing them down as the pawl moves back. This pin moves in a curved guide placed on each side of the pawl, which compels it to depress the teeth of the latter in moving backward and also prevents the spring beneath the pawl from raising it higher than is necessary to engage the ratchet teeth, when in the opposite position; the guide is sufficiently roomy to allow the pawl to spring down as the ratchet teeth pass over it. The radius bars supporting the jointed end of the pawl describe the same curve seen in the guide, so that the pawl moves downward and backward horizontally.

The pawl is released by the hand lever, K (Figs. 1 and 7), connected with the bar, L, and serves to turn the shaft, H, by means of a cam, shown in Fig. 7, by which the crank, F, is partially rotated. The coiled spring, M, acting on the cam, serves simply to maintain this gear in position for the pawl to engage the ratchet when the gun falls, and thus avoid the necessity of adjusting the pawl each time.

The model from which the drawings are taken was designed simply to show the chief features of the invention; and we publish them to explain the principles rather than the complete and developed system of Captain Eads.

A small pump would probably be employed to force water into the cylinder at a pressure of about 150 lb. per square inch, in order to raise a 15 in. gun to the firing position. This being accomplished, the proper quantity of water should be withdrawn, part of it into a small reservoir conveniently located about the carriage, for example, just forward of the air chamber, and over the cylinders. A pipe with a stopcock should connect this reservoir with the cylinder, and when extra charges are being fired an additional quantity of water should be allowed to flow into the cylinder, and thus insure a greater compression of the air without allowing the gun to fall any lower than usual during the recoil. When lighter charges are used less water in the cylinder is needed. The position of the reservoir would also allow the water to flow into the cylinder when the gun is raised and no air pressure exists, but when the gun is down the air pressure will force the water back into the reservoir, so that no pumping would be required.

If, on the other hand, the piece be loaded for the first time when above the parapet, no pump would be needed, as the power developed by the discharge and the fall of the gun is ample to restore it to its-firing position.

A vertical glass tube at the rear of the cylinder, with a connexion to the air chamber and the cylinder, should be added, to indicate the quantity of water present, and a few rounds of experimental practice would indicate the exact quantity required. This could then be marked on a graduated scale attached to the gauge. In low temperatures, glycerine, instead of water, should be provided.—*Engineering*.

NOTICE.

THE subject of the Essay for "The Durand Medal" for 1874 will be as follows :—

On the organization of the Intelligence and Topographical Department, best calculated to meet the requirements of the Army in India. It is suggested, but not insisted upon that the subject should be treated under the following heads :—

(a) Remarkable instances when the want of information has injuriously affected the operations of British and Indian Armies.

(b) Instances in General Military History when good intelligence arrangements have markedly added to the success of operations.

(c) Arrangements for the collection of Military Information in peace and in war, either adopted by the most celebrated Commanders of former years, or at present existing in the Chief Armies of the world.

(d) Proposed organization for the collection and arrangement of Military information in peace, and for gaining intelligence in war ; suitable to the Army in India, and showing in detail, cost, establishment, etc.

(e) No essay to exceed 100 pages.

(f) Open to all ranks of H. M.'s Army and Volunteers in India.

(g) Essays to be published (if deemed advisable) in the Journal.

(h) Each essay to be distinguished by a *nom de plume* and forwarded to the *Secretary at Simla* by the 1st November 1874—to whom also the writer's real name and address should be sent in a closed envelope.

(i) Lieut.-Colonel F. S. Roberts, Offg. Quarter Master General, has kindly consented to decide on the respective merits of the Essays.

H. H. STANSFELD, *Lieut.-Colonel,*
Secretary.

NOTICE.

MEMBERS of the Institution who have not already done so, are earnestly requested to pay their arrears of donation and subscription, either to the Corresponding Members at their stations, or direct to the Secretary at Simla.

Many members still owe their donation and three years' subscription.

Officers, who may wish to become members are requested to be kind enough to forward their donations and subscriptions at the same time as they express a wish to join the Institution, and also to inform the Secretary, whether their subscription is intended to be for the current year which ends on the 31st May.

The subscription for 1873 expires on the 31st May 1874.

It is hereby notified for the information of Members of the Institution that the Exhibition of Military Drawings unavoidably postponed from last September will be held at Simla in September 1874, all drawings intended for competition to be with the Secretary by the 1st of that month.

The Prizes will be awarded by a Committee of the Council.

There is no limit or condition as to style, or subject of the drawing for this year's Exhibition, but it is considered advisable by the Council that only Military men should contribute. Drawings of Fortification and Artillery will also be allowed to compete.

H. H. STANSFELD, LIEUT.-COLONEL,
Secretary.

NOTICE.

MEMBERS on changing their addresses are particularly requested to notify the change to the Secretary, in order that delay in forwarding the Journals may be avoided as much as possible.

The address book is corrected up to date from the Army Lists, but mistakes are occasionally unavoidable unless members themselves promptly notify their change of residence.

Members proceeding to England on leave, who wish the Journal to be forwarded to them while absent from India should inform the Secretary, and send stamps for the overland postage by Brindisi or Southampton as they may wish.

When a member appears in orders for leave to England, his Journal is not despatched unless he asks for it, and while absent from India his subscription is not payable unless the Journal is supplied.

Members on return from furlough can obtain the numbers of the Journal that have been published during their absence by paying the subscription for that period, and all members on returning to India should inform the Secretary of the fact at once.

H. H. STANSFELD, LIEUT.-COLONEL,

Secretary.

ORIGINAL PAPERS.

I.

NO *RADICAL* CHANGE IN THE TACTICAL FORMATION OF OUR INFANTRY REALLY NECESSARY.

WHETHER the Defensive has an advantage over the Offensive, or the Offensive over the Defensive, is one of those tactical questions which is always being discussed but never satisfactorily settled.

So long however as the necessity for acting on the Offensive under certain conditions remains unquestioned, it matters little, in the discussion of attack formations, whether the Defensive is supposed to have a primary advantage or not.

Assuming therefore that when two opposing forces take the field, one or other must, at some time during the campaign, find itself compelled to assume the offensive, it would seem scarcely prudent in the present day for any nation, possessing a standing army, to declare war, unless some recognized system of attack shall have been adopted for the guidance of its troops and well practised beforehand.

If this necessity be recognized, it follows that the British army at the present moment is hardly in a fit condition to enter on the work of a campaign, and no apology therefore is necessary for drawing attention to the urgent need of a speedy settlement of this important question; or for my again discussing what attack formation and tactics are best suited to the present organization of our infantry.

In order to simplify the discussion, it will be well to assume that the enemy has taken up a position, the approach to which is free from any cover worth mentioning. If such a problem can be satisfactorily solved, an attack where cover *is* available, becomes, comparatively speaking, easy.

The new work by Major von Scherff, "*Studies in Tactics at Infantry*," translated by Colonel Lumley Graham, has appeared at a most opportune moment for those who deprecate the introduction of the "*Order in Disorder*" system, and the skirmisher swarm formation.

Major von Scherff, an officer on the Head Quarters Staff of the Prussian army, serving under the immediate orders of Count Moltke, has had the full benefit of the experience of the late war to guide him in his tactical deductions; and during the campaign must have been in a position for accurately gauging the merits and demerits of the formations for the German Infantry, which were improvised after the failure of the attack on St. Privat by the Prussian Guards, and which have been so warmly advocated by so many German and English officers.

The favourable manner in which the work has been reviewed, not only in Germany but in nearly every country where a standing army is maintained, affords a sufficient guarantee of the military ability of the author.

His *general* conclusions as to the manner in which an Infantry attack should be conducted, based as they are upon the experience of war as it is and not as it was, and reasoned out with great care and fulness, are to me a convincing proof that the introduction of rifled guns and breech-loading rifles need not interfere with that control over the several tactical units of a line of battle, the value and importance of which, until very lately, has never been questioned.

“The necessity of control remains the same now as ever.”

“Much steady practice is required, unless we wish to see what may easily happen in the heat of such battles as we have now, whole divisions melt away, like snow under a March sun, *useless because not under control of the one commander.*”

“Twelve battalions, four regiments, two brigades, may all have been thoroughly trained beforehand in ‘battle practice’; yet when united into a division they may do little good as such, they may even get it and thereby also themselves into a scrape, if they are not accustomed to *subordinate themselves completely to the undivided command of their divisional general.*”

These extracts from the second part of his book show how entirely he differs from those of his brother officers, who advocate the absolute independence of the company unit, and the skirmisher swarm formation.

Fortified then with von Scherff’s authority, and with the full intention of extracting freely from a book, which has been pronounced so unanimously to be the most carefully reasoned out work on modern Tactics that has yet appeared, I venture once more to come forward as the advocate of a system of attack, (differing somewhat from that which I sketched out before, but retaining its principal features,) by which the subordinate officers, whilst given, in a certain direction, full freedom of action and ample opportunity for the exercise of judgment and intelligence, are yet made to work towards one object under the direct control of their immediate commander; and by which all the valuable characteristics of our line formation are preserved.

The requirements which von Scherff lays down as necessary to a good attack formation are as follows:—

- a. The very greatest mobility ;
- b. The greatest possible security from the effects of the enemy's fire ;
- c. The greatest possible development of its own fire ;

and he goes on to say, that “ hardly any further arguments are needed to prove that extended order is more adapted to the three above named main requirements for offensive action than any formation in close order.”

From this passage taken separately, it might be inferred that von Scherff advocates the attack being made entirely in extended order. Such however is not the case.

He divides his attacking force into an advance and a main body, one-fourth to one-half being allotted to the former. The advance is in extended order, whilst of the main body formation he speaks as follows :—

“ We must do justice to the oft repeated and defended demand that the main body also should move in *open line*.”

“ It cannot indeed be denied that there are certain advantages in such a formation, but we cannot yet persuade ourselves that the great losses which we have all along declared to be as irresistible as incalculable, are thereby to be really prevented.”

“ We do not however esteem the morally tranquillising effect of this formation so little as to wish to forbid its being used *on the commander's own responsibility*, though we consider it specially applicable to the supports which are intended afterwards to skirmish, but not suited to the main body, whose massive force alone will tell. In peace exercises at least, we should not willingly recommend it for use by the latter.”

The attack formation advocated by von Scherff is, in fact, almost exactly in spirit that which the British army has been accustomed to for many years past, only modified to meet the requirements of the day.

He sends out one company (Prussian) to cover the front, one company in support, to reinforce eventually the advanced line, and he keeps two companies, or half the battalion, in close order as reserve.

The essential difference however between his system and the old one is, that the skirmishing line and supports are kept in front from the commencement of the attack to its finish, and the main body companies, although brought up to the attack in close order, are never called upon to fire a shot, but are simply used to push on the two leading companies to the “ bitter end.”

Von Scherff in fact appears to be halting somewhat between two opinions. He evidently fully recognises the value of the close order formation, and the necessity of employing it in the last stage of the attack ; but he cannot apparently bring himself to admit boldly that a position, well defended, can really only be forced by troops brought up to the assault in close order ; consequently, in places he appears rather inconsistent.

For instance, at page 17, he says—" We may therefore affirm that individual order has actually become the only battle-formation for Infantry"—but farther on, at page 80, he advocates strongly close order for his main body companies and lays down company, columns for them up to about 700 yards of the enemy's position, and then a *deployed line* !

It appears to me, that to place a certain number of men in the front line of the attack from the commencement, and to expect them to remain in front until the position is stormed, is to demand more than human nature can be expected to perform. It would in fact be a "forlorn hope," called upon to advance in cold blood over a space of about 3000 yards. A sufficient supply of ammunition to such a body would of itself be a great difficulty, and at the critical moment the pouches might be empty.

Moreover to keep half a battalion unemployed, as it were, during the whole attack, seems to me a complete waste of power, and likely to damp the ardour of the main body companies. Nothing is more trying to troops than to be under fire without being able to return it, and I think that in this particular also von Scherff demands higher qualities from his troops than are usually found in them, and unnecessarily increases the difficulties of the attack.

Whilst fully concurring therefore in the distribution of the battalion for attack which von Scherff proposes, I differ from him regarding the manner in which the several parts should be handled and the part which should be assigned to each.

The formation I advocate for a battalion, either attacking singly or in line of battle, is as follows :—

Advanced Body.

Two companies in extended order covering the exact front of the whole battalion when deployed, under command of a major.

Supports.

Two companies in line, placed one on each flank of the advanced line, if the battalion is a centre one, or both in echelon on the outer flank, if the battalion is on the flank. Both about 300 yards distance from the advanced line. When separate they should be under command of their own captains, when together on the flank, under a major.

Main body.

Four companies in line, with half a company interval between each, at from 500 to 600 yards from the advanced line, under command of the lieutenant-colonel.

These companies may be allowed to move separately under their respective captains, but one must be told off as company of direction, by which the others will regulate their advance.

I limit the extension of front to that of a battalion deployed, first because no single officer can well control a more extended line; and secondly, because the control over the larger units of brigade and division would also become impossible were each battalion to occupy ground much in excess of that laid down.

It must be remembered that the mounted infantry officers must now dismount when they come under aimed infantry fire; and that General and Staff officers cannot ride about to rectify mistakes or deliver orders to troops in such a position.

Manceuvring under infantry fire is therefore impossible; and under artillery fire will always be found hazardous and had best be avoided.

The importance then of the introductory period of the attack, as von Scherff calls it, cannot be overrated.

This period "implies the several acts of reconnoitring the enemy and the ground; of gaining time for deployment; of coming to a determination upon the object to be fought for; and upon the means to be employed; that is to say, of making your dispositions, and giving out your orders."

"As soon as the leader has determined upon his mode of action he has, so to say, cast the die, and victory depends on the throw."

"From that moment no hesitation, no half measures, are allowable. The commander's judgment as to "where" and "when" will unalterably and irrevocably determine the result of the operation."

The advance in attack formation on the enemy's position should be made when the force comes under artillery fire.

"Conditions of ground favorable to the attack and other circumstances, such as dull weather, the smoke which is caused by a fight which is already raging &c., may shorten this distance very much, just as, on the other hand, circumstances may arise to lengthen it. But as we are here dealing with average chances for both sides, we hold that, at a distance of 3,000 paces from the enemy an attacking force should form line of battle, and should in most cases, go straight to the point."

We will suppose then the lines of battle formed, the first line being composed of battalions in the attack formation already described, and that the order to advance has been given.

(The second and third lines of battle, as well as the artillery, must of course be assumed. I am only discussing the movements of a battalion in the first line of battle.)

Before carrying the battalion through the different phases of the attack, it may be as well to premise, that whether it is moving to attack the position in front or in flank, its movements will generally be precisely the same.

"However great the advantage of directing your attack upon the flank of an enemy, it is nevertheless imperative that the measures for doing this should be taken when they can be carried out unseen and unmolested by fire; as for instance during the introductory period; and such a manœuvre will never be favorable to success if attempted by an oblique movement under fire, or by "a change of front (which takes up a long time and is therefore prejudicial) after you are already engaged. The destructive effect of the enemy's projectiles will produce confusion as the inevitable consequence of such a complicated attempt; this will be followed by hesitation and a full stop; the attentive foe will take advantage of such a dangerous movement for making a doubly-damaging counter-stroke."

"*Straight to the front forward* is the word of command suited to the attack, and the only command which is sure of its moral impulse upon the soldier."

The advanced body then must move straight to its front, the brigade and battalions of direction being named as usual, and the supports and main body companies will follow at the regulated distance, keeping their proper position in accordance with its movements.

"The advanced body should get over the ground from its first entry into action up to within 1,000 or 800 paces, if possible within 600 paces, of the enemy, in one line," and "we should be inclined to make it a fixed rule that the advance be made entirely *without firing* under artillery fire, and till within the outer space of infantry fire."

"From this point onwards, where the losses from the enemy's infantry cease to be accidental, and where we can make out our opponents clearly, or at any rate their position, being at the same time plainly visible to them, it will in most cases be advisable to adopt one or other form of *gradual advance*."

Von Scherff then discusses very fully the three different methods which have been tried in practice, of bringing up a line of skirmishers so near to the enemy's position as to enable the battalion to make a final rush upon it, *viz.* :—

a. The advance of the whole line in one body ;

- b. The advance of the whole line by a succession of rushes, between which the men lie down and fire by word of command ;
- c. The advance of the line by fractions, those on the move being covered by the fire of those halted.

After carefully weighing the merits and demerits of the several methods, he expresses a strong opinion in favor of the last one ; but lays down as a condition that the fractions should not be smaller than entire divisions (züge) ; (three of which form a Prussian company when drawn up, as for action two deep.)

It is satisfactory to find the opinion, which I had expressed on this point in my former paper, confirmed by so good an authority.

Directly then the advanced body comes under aimed infantry fire, it will lie down by word of command and its further advance will be made by rushes.

Up to this point the authority of the Divisional General over his entire command will have continued in force ; but from this point onwards the advanced body will have to move under its own immediate commander.

Supports and main body companies will in like manner soon slide away from the control of the General, and unanimity of action, so essential in an attack, will then depend upon the clearness of his preliminary instructions and the intelligence of the subordinate commanders.

The rushes of the advanced body when in Brigade, should be made by an entire company, covered by the fire of the remaining companies. In a three battalion brigade therefore there would be one company advancing and five firing.

A fixed direction should be given to the advanced body of each battalion by the Brigadier, and this direction should be the objective point in the enemy's line of defence which it is intended that each battalion shall force, such as a house, the entrance to a village the corner of a wood, a large tree or some such conspicuous object.

" Each battalion on the front of attack should and will have its own special point to carry ;" for the front of a battalion deployed being about 250 yards, " it would hardly do to assign to several battalions formed side by side the same special object of attack."

After every successive rush the company to advance should be named by the Brigadier, who will be on foot in rear of the centre of his advance companies. No delay in the advance need be caused by this arrangement, which will keep the troops under thorough control.

The company advancing should be preceded by its captain, who will select the position where it is to halt, with reference to the best cover procurable in his front.

ORIGINAL PAPERS.

I.

NO *RADICAL* CHANGE IN THE TACTICAL FORMATION OF OUR INFANTRY REALLY NECESSARY.

WHETHER the Defensive has an advantage over the Offensive, or the Offensive over the Defensive, is one of those tactical questions which is always being discussed but never satisfactorily settled.

So long however as the necessity for acting on the Offensive under certain conditions remains unquestioned, it matters little, in the discussion of attack formations, whether the Defensive is supposed to have a primary advantage or not.

Assuming therefore that when two opposing forces take the field, one or other must, at some time during the campaign, find itself compelled to assume the offensive, it would seem scarcely prudent in the present day for any nation, possessing a standing army, to declare war, unless some recognized system of attack shall have been adopted for the guidance of its troops and well practised beforehand.

If this necessity be recognized, it follows that the British army at the present moment is hardly in a fit condition to enter on the work of a campaign, and no apology therefore is necessary for drawing attention to the urgent need of a speedy settlement of this important question; or for my again discussing what attack formation and tactics are best suited to the present organization of our infantry.

In order to simplify the discussion, it will be well to assume that the enemy has taken up a position, the approach to which is free from any cover worth mentioning. If such a problem can be satisfactorily solved, an attack where cover is available, becomes, comparatively speaking, easy.

The new work by Major von Scherff, "*Studies in Tactics at Infantry*," translated by Colonel Lumley Graham, has appeared at a most opportune moment for those who deprecate the introduction of the "*Order in Disorder*" system, and the skirmisher swarm formation.

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I limit the extension of front to that of a battalion deployed, first because no single officer can well control a more extended line; and secondly, because the control over the larger units of brigade and division would also become impossible were each battalion to occupy ground much in excess of that laid down.

It must be remembered that the mounted infantry officers must now dismount when they come under aimed infantry fire; and that General and Staff officers cannot ride about to rectify mistakes or deliver orders to troops in such a position.

Manœuvring under infantry fire is therefore impossible; and under artillery fire will always be found hazardous and had best be avoided.

The importance then of the introductory period of the attack, as von Scherff calls it, cannot be overrated.

This period "implies the several acts of reconnoitring the enemy and the ground; of gaining time for deployment; of coming to a determination upon the object to be fought for; and upon the means to be employed; that is to say, of making your dispositions, and giving out your orders."

"As soon as the leader has determined upon his mode of action he has, so to say, cast the die, and victory depends on the throw."

"From that moment no hesitation, no half measures, are allowable. The commander's judgment as to "where" and "when" will unalterably and irrevocably determine the result of the operation."

The advance in attack formation on the enemy's position should be made when the force comes under artillery fire.

"Conditions of ground favorable to the attack and other circumstances, such as dull weather, the smoke which is caused by a fight which is already raging &c., may shorten this distance very much, just as, on the other hand, circumstances may arise to lengthen it. But as we are here dealing with average chances for both sides, we hold that, at a distance of 3,000 paces from the enemy an attacking force should form line of battle, and should in most cases, go straight to the point."

We will suppose then the lines of battle formed, the first line being composed of battalions in the attack formation already described, and that the order to advance has been given.

(The second and third lines of battle, as well as the artillery, must of course be assumed. I am only discussing the movements of a battalion in the first line of battle.)

Before carrying the battalion through the different phases of the attack, it may be as well to premise, that whether it is moving to attack the position in front or in flank, its movements will generally be precisely the same.

"However great the advantage of directing your attack upon the flank of an enemy, it is nevertheless imperative that the measures for doing this should be taken when they can be carried out unseen and unmolested by fire; as for instance during the introductory period; and such a manœuvre will never be favorable to success if attempted by an oblique movement under fire, or by "a change of front (which takes up a long time and is therefore prejudicial) after you are already engaged. The destructive effect of the enemy's projectiles will produce confusion as the inevitable consequence of such a complicated attempt; this will be followed by hesitation and a full stop; the attentive foe will take advantage of such a dangerous movement for making a doubly-damaging counter-stroke."

"*Straight to the front forward* is the word of command suited to the attack, and the only command which is sure of its moral impulse upon the soldier."

The advanced body then must move straight to its front, the brigade and battalions of direction being named as usual, and the supports and main body companies will follow at the regulated distance, keeping their proper position in accordance with its movements.

"The advanced body should get over the ground from its first entry into action up to within 1,000 or 800 paces, if possible within 600 paces, of the enemy, in one line," and "we should be inclined to make it a fixed rule that the advance be made entirely *without firing* under artillery fire, and till within the outer space of infantry fire."

"From this point onwards, where the losses from the enemy's infantry cease to be accidental, and where we can make out our opponents clearly, or at any rate their position, being at the same time plainly visible to them, it will in most cases be advisable to adopt one or other form of *gradual advance*."

Von Scherff then discusses very fully the three different methods which have been tried in practice, of bringing up a line of skirmishers so near to the enemy's position as to enable the battalion to make a final rush upon it, viz. :—

a. The advance of the whole line in one body ;

- b. The advance of the whole line by a succession of rushes, between which the men lie down and fire by word of command ;
- c. The advance of the line by fractions, those on the move being covered by the fire of those halted.

After carefully weighing the merits and demerits of the several methods, he expresses a strong opinion in favor of the last one ; but lays down as a condition that the fractions should not be smaller than entire divisions (züge) ; (three of which form a Prussian company when drawn up, as for action two deep.)

It is satisfactory to find the opinion, which I had expressed on this point in my former paper, confirmed by so good an authority.

Directly then the advanced body comes under aimed infantry fire, it will lie down by word of command and its further advance will be made by rushes.

Up to this point the authority of the Divisional General over his entire command will have continued in force ; but from this point onwards the advanced body will have to move under its own immediate commander.

Supports and main body companies will in like manner soon slide away from the control of the General, and unanimity of action, so essential in an attack, will then depend upon the clearness of his preliminary instructions and the intelligence of the subordinate commanders.

The rushes of the advanced body when in Brigade, should be made by an entire company, covered by the fire of the remaining companies. In a three battalion brigade therefore there would be one company advancing and five firing.

A fixed direction should be given to the advanced body of each battalion by the Brigadier, and this direction should be the objective point in the enemy's line of defence which it is intended that each battalion shall force, such as a house, the entrance to a village the corner of a wood, a large tree or some such conspicuous object.

" Each battalion on the front of attack should and will have its own special point to carry ;" for the front of a battalion deployed being about 250 yards, " it would hardly do to assign to several battalions formed side by side the same special object of attack."

After every successive rush the company to advance should be named by the Brigadier, who will be on foot in rear of the centre of his advance companies. No delay in the advance need be caused by this arrangement, which will keep the troops under thorough control.

The company advancing should be preceded by its captain, who will select the position where it is to halt, with reference to the best cover procurable in his front.

No individual soldier must leave his place, nor must the captain move his company out of the perpendicular line of the advance ; as if he does so, he must necessarily interfere with the company on the flank to which he has moved ; confusion will be caused and the proper direction lost.

It is of course impossible to lay down how near the advanced body will be able to approach to the enemy's position ; but the task which it is expected to perform is very clearly stated by von Scherff.

" The first or skirmishing line has, in the supposed case of a battalion with an assigned object of attack, most undoubtedly a task complete in itself and with one object in view. This task consisted in endeavouring to overwhelm with its fire from a front, not originally exceeding 300 paces, some always smaller portion of the enemy's position which has been pointed out, and thus to shake the defenders before the onslaught of the main body."

To perform this task effectually requires the steadiest and most accurate of firing. I myself doubt the possibility of controlling by word of command, the fire of the advanced body except during a peace manoeuvre ; and we shall have, I expect, to trust to the intelligence, discipline and good training of the individual soldier to carry the attack through this second stage.

It would seem worthy of consideration whether in every battalion there should not be two companies, composed of the best shots, who should be especially trained to the duties of the advanced body, and practised at firing on small objects *from a lying down position at distances varying from 800 yards up to 200 yards.*

The advantages of a company working together under its own officers are so great, that I dismiss as unsound the idea, which I once entertained, of covering the front with selected men from each company. Such a line would have no cohesion, and the valuable principle of unity of command would be sacrificed.

But two companies, specially trained, and consisting of men, all of whom had been selected as steady first class shots, and who were one and all thoroughly impressed with the importance of the task they had to perform, would I believe create such an impression of the superiority of the attack upon the minds of the enemy in the front line of the defence, as would materially add to the chances of success.

Von Scherff lays down the following principle, for what he calls the *preparation of the attack* :—

" In order to prepare the way effectively it is necessary to bring up your skirmishing line to between 200 and 400 paces of the enemy's position, and to overwhelm with a concentrated and uninterrupted fire the particular part of it on which you intend to direct your assault."

I am myself inclined to think that 200 yards is the *maximum* distance from which a charge can be made, with any reasonable prospect of success, upon a position firmly defended by troops armed with breech-loaders, and that consequently it should be the object of the advanced body to advance beyond that point if possible.

It may of course however be reasonably expected, that the fire from the defenders front line will at times be so severe as to prevent the advanced body reaching even to the maximum distance laid down.

The advanced body under such circumstances, would have no option but to remain lying down, and endeavour by cool, accurate firing to keep down the fire of the front line of the defence, or at least to make it unsteady.

Whenever the advanced body is thus brought to a stand still it will be the duty of the supporting companies to come to its assistance. They must be brought up at the double, one after the other when both are together, so as not to afford too favorable a target for the defence, and on arriving close *in rear* of the advanced body they will be halted at a half company distance from each other, and open an independent fire upon the position, *both ranks kneeling*.

It may fairly be assumed that this increase of fire to the advanced body will give it a certain amount of propelling power, and will enable it to make a further rush, or two, forward.

Should such be the case, the supporting companies will lie down on their own ground, and will not again advance until their assistance is once more required, when it will be afforded in precisely a similar manner to that just described.

In order to carry on the narrative of my attack, I must now assume that the advanced body and the two supporting companies have at last all been brought to a stand-still within the distance laid down as suited to a charge, and that it has become necessary to bring up the main body companies.

The "preparatory stage" is completed ; and "the work of breaking the enemy's power of resistance, by employing the greatest possible amount of striking power," or, as von Scherff calls it, "The stage of execution," has arrived.

It will be necessary, however, before proceeding further, to take into consideration the manner in which the supporting and main body companies must advance during the "preparatory stage."

It will be remembered, that the advance of the advanced body has been divided into two periods ; viz :—From the moment of coming under artillery fire until it reached the zone of *aimed* infantry fire ; and then from that point up to about 200 yards of the enemy's position.

The advanced body is in fact only exposed to *aimed* fire both of artillery and infantry ; but the supporting and main body companies will suffer from the effects of the chance shots which go over its head.

In order therefore to bring up these latter companies with a minimum of loss it is necessary to take into consideration the "fire effect" of the "chance shots."

"The modern infantry rifle propels its bullets to the distance of from 1,200 to 1,800 paces. The individual soldier on opening fire is not able to judge his distance accurately ; his misses are, and must be therefore, very numerous indeed ; and they will be all the more numerous the greater the distance at which we commence firing ; but all these ill-aimed spots render the ground lying behind the objects aimed at extremely dangerous to traverse, but dangerous to an extent utterly incalculable."

"Modern artillery, on the other hand, possesses much more effective means of controlling its aim, also of correcting it, and of estimating the distance. But the peculiarity of its projectiles renders its misses only dangerous to the extent of the error in estimating distance, which experience shows us to be (and this is advantageous to the assailant) more often *too low than too high*.

"That is to say, a body of troops following in second line will not suffer from artillery fire directed on the first line, unless it come within about 300 paces of it ; but if the first line is the object of infantry fire, the second line will probably share its losses from the moment it gets within extreme rifle range."

"It follows from these various considerations that in calculating how far the formation of an attacking force can contribute to guard its *striking power*, physical and moral, from being impaired, we have to divide the action of the main body into three stages : first, from the commencement of the movement to attack up to within from 1,200 to 1,800 paces of the enemy's position ; secondly, from thence until close up to the advanced line ; lastly, during the remainder of the distance."

In the first stage von Scherff points out that we must aim at not affording such a mark to the enemy's artillery as will induce him to aim at the main body companies instead of the advanced body and its accompanying artillery. I venture to think that companies in line, with half company intervals between them, will afford a less attractive mark than "the columns of moderate size with a front not exceeding from 50 to 80 paces, and a depth of from 20 to 30 paces (from 6 to 12 files) ; with intervals, if thought expedient, of about 100 paces," which he recommends.

As regards the formation to pass through the second stage, he expresses the following very determined opinion :

"At this period, the fire, both aimed and unaimed, will be so intense

upon the whole space, but at the same time (unless led to concentrate itself by the assailant's adoption of particularly unskilful formations in mass) so equally spread and in a manner so impossible to calculate, that in whatever formation the assailant advances along the whole front, as long as he avoids too dense bodies, his losses will remain much the same."

"We decidedly assert that it is neither necessary nor will it be of any use to try and invent tactical formations calculated to diminish loss at this stage of the proceedings; rather is it possible and expedient to search for formations tending to weaken the moral effect which the inevitable losses are sure to produce, and thus *indirectly* to contribute to the *striking power* of the attack that assistance which these formations cannot give *directly*."

Von Scherff then goes on to point out that the losses spread over a line produce far less moral effect on a body of troops than if the same loss were experienced in a column, and he winds up his argument as follows:—"The formation " should be as favorable as possible to forward movement, and it should not require to be changed when you come to close quarters."

"The forward movement will be favoured both directly and indirectly by the *broader front and lesser depth*," which is also "favourable to the use of fire arms."

Von Scherff whilst in this portion of his work accurately describing all the characteristics of the line formation cannot bring himself apparently to recommend its use, but substitutes for it small columns with "a front of thirty or forty paces and a depth of six or eight files," and a space between them "equal to or double the front of each."

Such a formation is clearly not adopted to the present organization of our infantry, and I must again express a decided preference for the four companies in line with half company intervals. They are clearly "favorable to a forward movement," and no British soldier would wish their formation changed when coming to close quarters.

The supporting and main body companies will then remain in line from the commencement of the attack to the end of it, and the following instructions are all that it will be necessary to give to them, as to ensure their proper co-operation—

a. To follow the movements of the advanced body in the exact positions allotted in them at first until comes under aimed infantry fire.

b. When the advanced body commences to gain ground by rushing forward and lying down, the supporting companies will get as near to it as they can with due regard to their own safety; and the main body companies will decrease their distance from the advanced body to 300 yards, but remain at that distance until they are wanted in front.

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c. Both supporting and main body companies, when they come into the zone of *unaimed* fire, 1200 to 1500 paces from the enemy's position, will advance by alternate rushes and lying down, either by companies or simultaneously.

d. Supporting companies, when the advanced body is brought to a stand still, act as already described ; viz. move up in rear of it and open fire, both ranks kneeling.

e. Main body companies, when the advanced body strengthened by supporting companies cannot get on any further, will double up, one after the other, to close behind the advanced body which is lying down, and forming line with somewhat less than half company intervals, on the supporting companies, will open an independent fire, both ranks kneeling.

It may of course happen that the advanced body, even though assisted by the supporting companies, will not have been able to advance within charging distance of the position. In such a case the main body would have to send up as many companies to help as would, by bringing a superiority of fire to bear on the front line of the defence, enable it to get on farther. These companies, after performing their task, would remain lying down until joined by the remainder of the main body.

At this stage of the attack six companies will in fact be in line, occupying the distance which was required for the whole battalion when deployed, whilst two companies will be lying down in front of them ; the three lines firing as rapidly as they can.

My own impression is, that, at this stage, the possibility of laying down any further instructions regarding the manner in which the attacking troops are to assault, is very problematical. It will of course be necessary to practise troops at peace manœuvres in making the final rush, in order that they may understand thoroughly how much is required of them ; and such being the case it is essential that some recognized method of making this rush should be laid down.

In discussing the relative merits however of two attack formations and when judging of them on the manœuvre ground I am satisfied that the sole test of superiority of one over the other, which it is possible to establish, is by judging of the movements of the attacking bodies up to that point from which their final rush is to be made ; and that whichever of the formations will apparently bring troops so far with the minimum of loss and in the best order for striking the last blow, should be pronounced the best.

From that point, in my opinion, success will simply depend upon the relative courage of the two opposing forces.

As however it is not possible for any person to argue with any weight on what should be done at this stage of the attack, unless he has

been an eye witness of the tug of modern war, when breech-loader meets breech-loader, I must confine myself to quoting extracts from von Scherff regarding this difficult point, and leave my readers to form their own conclusions from his recent experience.

Von Scherff says :—

“Now it is not in human nature for even the best troops in the world to hold out for more than a few minutes, whilst they and their opponents are keeping up a rapid independent fire, such as it would be, upon one another at so close and effective a range (for we presume both parties to be equally well armed). Not to mention the actual loss, which is often not at all in proportion to the expenditure of ammunition, the moral effect of such a fire upon the nerves is such that the crisis will be hurried on very quickly by the excitement thus produced.”

“We must not imagine the defender with the advantage, which he has of the more favorable position, to be in other respects inferior to the assailant; we must not suppose him to bolt; therefore, after a very short time, the attacking force will either be seized with the impulse to rush forward to close quarters, or to turn tail.”

“Assuming from the lessons of the late war, a rapid independent fire from both sides, such as above supposed, cannot well last above five minutes without bringing things to a crisis.”

Von Scherff, in the above extracts, is speaking of the action of the advanced body, which has arrived at between 400 and 200 paces from the spot at which it has to force the enemy's position; has been reinforced by the supporting company; and is waiting for the arrival of the two main body companies, which are steadily advancing to its assistance.

“As soon as the main body has arrived within about 50 paces of the line of skirmishers, now reinforced by the whole of the supports, the commanding officer gives the signal for the assault, which will be made by both advanced and main body together in double time (from 120 to 150 paces in the minute) whilst the drums beat the “*storm march*,” and the bugles constantly repeat the call: *as lively a fire as possible being at the same time kept up by the advanced troops during the movement*, which continues thus to within about 20 or 30 paces of the enemy, then terminates in a rush at full speed with a cheer and the position is carried.”

How the “lively fire” is to be kept up by the advanced body when doubling in front of the main body for some 300 yards, von Scherff does not explain!

If the defenders remain firm, undeterred by the tremendous fire which has been poured into them at 200 yards distance, no doubt such a covering fire is absolutely essential to ensure success to a charge. Von Scherff himself declares such a charge to be impossible, unless covered by fire, and yet, when it comes to a description of the actual assault, he can-

not devise any better plan for producing it than to make the skirmishing line keep up a rapid fire when at the double !!

" There used to be a theory, not indeed yet quite exploded, according to which a storming party should attack *without firing a shot.*"

" We have accepted the distance of 400 paces as sufficiently close to the enemy for the advanced line of skirmishers to perform its task, considering the capabilities of the breech-loader of the present day; only under peculiarly favorable circumstances will it be feasible to reduce this distance to 200 paces. Taking then 300 paces as a mean between the two distances, we are to expect a mass, no matter how formed, to rush upon an enemy, armed with the breech-loader, for two minutes without firing a shot !

" All this, it may be said, never really happens ; on the contrary, judging from war experience, we might maintain that the onslaught of skirmishers would of itself suffice."

" But here we are speaking of a seriously conducted and well-situated defence, so that in theorising, we must keep in view all means by which any possibility *may* be useful, and, in difficult moments, must needs be and have been, useful."

" It is to be desired that the approach of the main body should impart a fresh impulse to the advanced line, tending to stimulate the forward movement which will culminate in the decisive assault. This last forward movement must be covered by as vigorous a fire as possible, which can, however, only proceed from the advancing troops themselves. Though it is doubtless true that this fire will not do much harm to the enemy yet it must not cease."

" What we have to do is to overwhelm the point of attack with as tremendous a fire as possible ; we must not at this moment think of something to aim at ; on the contrary the last stage of the *preparatory* fire will be most effective, if it prevents the defenders from daring to poke their noses out of cover."

Nothing can be pronounced impossible until it has been properly tried and failed, and I hesitate therefore to condemn as impracticable von Scherff's instructions for covering with fire the troops making the final charge.

There can be no doubt that the attack of a position in the present day resembles much what the storm of a breach or the escalade of a fortress, used to be in former days, and that a special covering party told off to keep down the fire of the defenders, and to protect the advance of the assaulting party, is now as great a necessity for the former, as it used to be for the latter, operation.

In my former paper I suggested the possibility of this task being undertaken by two companies, one on each flank of the attacking line, who should push forward, covered by the front fire of the other compa-

nies, and thus obtain a position from which an oblique fire could be brought to bear on the defender's front line, whilst the final rush was being made.

Von Scherff seems to consider such an arrangement as "simply impossible, unless quite exceptionally there chance to be flanking positions favorable to the attack, but which we must not here take into consideration in this study of a front assault."

However this may be, it appears to me that success at this stage of the attack cannot be secured by any tactical formation, but must depend on the good order with which the assaulting party have been brought up ; on the formation which has enabled the inevitable general loss to be as much as possible concealed from the observation of the attacking troops ; and, last but not least, on the individual and collective courage of the troops themselves.

I shall assume therefore that the concentrated fire of the whole battalion, from a distance of about 200 yards, has produced its effect ; that the fire of the front line of the defence has been overpowered, and that the six companies have passed over the skirmishers of the advanced body and have successfully stormed the position. The two companies which have so efficiently performed their share in the attack should, on being passed over, rise and follow the remainder of the battalion, closing on their inner files as they do so.

It only now remains to point out that a defensive position has depth as well as breadth, and that therefore the successful storming of the front line does not necessarily mean that the position has been carried, Von Scherff mentions "as a final requirement necessary to success, that the last decisive onslaught with shot and bayonet should be continued until the assailants actually reach the *further limit of the object of attack* (the further border of wood or village, the crest of a hill, &c.)"

"An immediate rush forward beyond the border of the position is altogether inadmissible. The assailant will do much better if he at once prepare the point which he has captured for defence."

That blind forward rush beyond a position which has been carried, that reckless charge upon the enemy, without a thought of your neighbours, has gathered many a laurel, but has also compromised many a success, and has led to many a repulse ; it has only cost the perpetrators their lives, but it has cost the army victory."

"Therefore, *only one object at a time !*"

"As soon as the success of the attack may be considered complete, every officer must do his utmost to restore order as quickly as possible in his immediate neighbourhood, and by degrees throughout the whole mass, in spite of the over excitement or reaction which will probably prevail."

I have thus conducted a battalion through all the stages of a successful attack, and it remains with my readers to decide for themselves whether the attack formation which I advocate possesses the characteristics that have been laid down as necessary for it by those who know what war now is.

The advantages I claim for it are, absolute simplicity, an indispensable qualification when troops are under fire; and the avoidance of any radical change in the organization, or field exercise, of our infantry.

Many writers on tactical formation of infantry, in view to lessen the disorder of the skirmisher swarm formation, which they assume to be the only one to be adopted, advocate that "the company should be made a complete skirmishing body in itself, skirmishers, supports and reserve; either by dividing it into sections, or by working it in fours deep.

Such a plan at once knocks on the head all unity of command, giving the captain three, and the lieutenant-colonel twenty-four fractions to look after, instead of one and eight respectively.

It breaks up the battalion as well as the company into a number of small irresponsible fractions, not one of which would be capable of acting independently if required; and it assumes that the front or a skirmishing line will always require re-inforcing in exactly the same proportion all along the line.

What would be the condition of a battalion in such a formation if suddenly ordered to form line or even to show a front, to a flank in order to receive cavalry. If in four deep formation it would be absolutely helpless; if in sections, it could not produce any appreciable amount of fire power without mixing up the different sections of different companies, in such a manner as to produce that very state of confusion in the battalion which the formation is intended to avoid.

A tactical formation cannot be considered suitable which only admits of a battalion being moved in one direction.

I lay the greatest possible stress upon the value of working by entire companies; and I deprecate the idea of destroying their individuality, either by mixing up two or more together into a heterogeneous mass, by adopting the skirmisher swarm; or by absorbing them into the larger unit of the half battalion, or even the double company.

Every regimental officer knows well the wholesome, friendly, rivalry which exists between companies of the same battalion; which in many cases, equals if it does not exceed, the "*esprit de corps*" of rival regiments.

That friendly rivalry, which in peace time is kept alive by rifle, foot ball and cricket matches, &c., &c., will if permitted, bear ample fruit on the battle fields of the future, and I am bold enough to think that the key to the difficult problem, which so many are now trying to work out, lies in the simple solution I have now put forth.

Let no one suppose that I am advocating the *absolute* independence of the companies during an attack ; all that I recommend is that they should move *separately* under the command of their own captain, but in subordination to the orders of their battalion commander.

Von Scherff is very decided on this point, as the following extract will show.

“ In spite of all theorising upon the idea of the *tactical unit*, the most fanatical admirer of the company column must confess that the company is too small a body to carry out an attack through all its three stages, always supposing the operation to be on a large scale.”

“ Twelve company columns will not be able to carry out, each independently for itself, the preparation and execution of an attack, whilst three battalions are quite competent to do it.”

(It will no doubt be remembered by most of my readers that a German battalion equals four companies.)

“ We shall return to this subject in dealing with the further stages of the battle ; we only touched upon it in this place in order to arrive at the conclusion (a certain one we think), that when it appears necessary to sub-divide the object of attack into separate objectives it will be well not to assign one of these to a smaller body than a battalion.”

Only one more point remains for me to touch upon, and that is with regard to the limitations which I have placed on the use of cover by the men of the “ advanced body.”

In my opinion the whole success of a difficult attack will depend in a great measure upon each man of the advanced body being kept in his place, and upon the responsibility for obtaining the best cover during the advance being thrown upon captains of companies.

As Von Scherff lays down so clearly a broad distinction must be drawn “ between demonstrative and decisive action in battle with reference to ground.”

“ Whilst for instance in demonstrative combats a force is not only justified in suiting and subordinating its action to the ground, but also bound to do so ; in a decisive battle it can only seek to avail itself of the ground as far as possible, and to make the best use of it *in the one decisive direction*.”

The distinction which Von Scherff draws between a demonstrative and a decisive action is shown in the following passages :—

“ In order then to promote a clear system of instruction in time of peace, the end we are now aiming at, it appears necessary both in theory and practice, to establish the distinction between the *fighting which aims at a decisive result, and that which aims at no decisive result*.”

"Whoever determines upon the offensive should undertake it with his whole energy, and should make full use of all the means at his disposal."

"It is possible for the attack to fail, but it is impossible for us to go back. The sword cuts or flies to pieces, the army conquers, or there will only be its fragments to collect."

"To make an *attack* in such a spirit as this, you require your whole available strength; otherwise it ceases to be an *attack*, and becomes merely a *tentative advance with a retreat quickly impending*."

But "every body of troops engaged in decisive operations requires to have a number of secondary tasks executed beyond their scope, and both before and after them. Such tasks are rarely to be performed except by force of arms, yet have but little to do with the final object of every real battle, namely, decisive victory." "All these reconnoitrings, outpost, advanced and rear guard actions may be comprehended in the term *Demonstrative combats*."

"These troops will sometimes act offensively, at other times defensively, but as they never aim at a decisive result, and as their task is always rather to gain time and room, they never make a real attack or a real offence."

"To perform the work required of them their formation should be very flexible, and with more front than depth, only consisting of one line, with may be a reserve held back."

The demonstrative combat in fact admits of a skirmishing line in the sense in which we have always understood it, where the individual soldier is at times allowed a considerable latitude as regards taking advantage of ground, and can be permitted to exercise it, without much danger of confusion to the general line, in consequence of the increased space between himself and those on his right and left. But, as Von Scherff points out.

"The use of masses in extended order for *decisive* action has nothing in common with the employment of *skirmishers* in extended order for *demonstrative* purposes."

"All the above mentioned tactical errors of our Infantry are to be attributed to the fact of this distinction not having been sufficiently recognized in the press and hurry of the first moment, a distinction which has still been treated as of little consequence in the peace training subsequent to the war, and which has now assumed decisive importance. This complete distinction, however lies, in our opinion, in the radical difference between *demonstrative* and *decisive* action in battle with reference to the use of ground."

I offer no excuse for having quoted so freely from Von Scherff's very exhaustive work. The extracts in themselves cannot

fail to interest those who are anxious to derive as much benefit as possible from the experience of the late war ; and I trust that they may in some measure offer an excuse for the determined opinions I have expressed, by showing that those opinions are to a great extent supported by one who was an eye-witness, and a critical observer of the most interesting events which occurred during the campaign of 1870-71.

FRED. THESIGER,
Adjutant General.

II.

ARMY WORKSHOPS.

So long as the memory of the "Great Mutiny" remains, so long we think must the name of Lord Strathnairn be held in grateful remembrance for his prominent and decisive share in the suppression of it; but to our mind he did almost as good service, and certainly established an undeniable claim upon the gratitude of his countrymen and more particularly those of his own profession, when in 1861 he matured and laid before Government his admirable plans for the establishment and maintenance of Regimental Workshops. We have said his admirable plans, for though we believe that the idea did not by any means originate with Sir Hugh Rose, and though it is well known he had the advice and assistance of many able officers and notably of the late Colonel J.E. Robertson, then commanding the 6th Regiment; still he took such a deep interest in the scheme, urged it so warmly, enlarged its scope so successfully, and became to so great an extent responsible for its failure or success, that it may not unfairly be called his own.

Since the general establishment of these institutions, rather more than a decade has now passed away; and it may interest many readers, civilian as well as military, to learn with what measure of success they have been attended; for what merits they have become conspicuous, and what faults and short-comings have been detected. In an attempt to answer this, as impartially as possible, we must be guided not merely by the rose-tinted reports of committees, not by the laudatory extracts from General Orders, not by the pardonable pride of successful corps; but also by some well grounded complaints which have from time to time come under our notice, and by some inherent defects which have become tolerably obvious in carrying out the original design. Of the merits of the scheme we would first speak, and may premise that up to a certain point they are precisely such as the promoters had in view; but as we shall presently show they have fallen, when judged by the experience of ten years, exceedingly short of what might fairly have been expected. It is undeniable that Regimental Workshops have proved a ready and remunerative resource to skilled workmen of various kinds, who were in olden days turned to little or no account, and for the most part forgot their trades in idleness and drink. It is also equally true that to many men of small skill and to some with none at all, the workshops have proved most beneficial in imparting rudimentary instruction. The benefits accruing to the men employed in the shape of increased incomes, continuous light labor, retention and development of knowledge and enlarged prospects of employment on discharge, these we say are immense, and are pretty generally appreciated by the recipients. To the Regiments or Batteries the gain is quite as great; for, instead of being as in former days, almost wholly dependent upon extraneous labor for even the most trivial jobs, public or private, it will now be found that most corps contain within themselves a body of carpenters, joiners, boot-makers, tailors, &c. &c., &c., competent in numbers and in training to per-

form all that can usually be required of them ; and if this be advantageous in the piping times of peace, it becomes of the very utmost importance upon active service, and when severed from the chance of all other aid ; and there is no doubt that in coming campaigns the effects of workshops will be clearly felt in the increased measure of confidence and helpfulness which they have inspired. So far we have alluded to them in their public capacity so to speak, as being likely to return good interest to the State for the money and trouble expended on them ; but we need hardly tell any of our readers that a very considerable amount of private work is also done in most of the shops, and consequently in many small stations in this country the workshop is a positive boon to the residents. There are two or three other points upon which the Army could be justly congratulated, in connection with its workshops ; but we think we have said enough, to show that in many ways they are eminently successful ; and if we now proceed to point out some few failings, it is because they are very easy of remedy, and if remedied must conduce largely to the prosperity and prestige of the system, which appears to us capable of still greater expansion. Our first objection then is to the paucity of workmen employed in the different shops ; we do not mean at any one given time, for we believe that as a rule in most Regiments the shops are as fully manned as the demand for work and the capabilities of the shops will admit of ; but what we do object to and what we know that many thoughtful officers conversant with the subject do object to, is that more men are not passed through the different shops from time to time, and thus afforded an opportunity of keeping up their trades and earning an honest penny. Take an example. In a regiment seven hundred strong, there are say thirteen men by trade either carpenters or joiners ; now after a fair trial one of them is found to be so much superior to the rest, that he is appointed foreman of his shop and there he remains, and most properly so ; to this we cannot demur, for the best workman, supposing him to be a steady well conducted man will usually make the fittest foreman and as such should be retained. But we do think that the remaining twelve should each and all have their turn, instead of as is the case in many regiments two or three men being picked out and kept permanently on to the exclusion of all the rest. This is not a mere fanciful grievance, and we are assured that there are many men of many trades in every corps, who would gladly go to work if there was only room made for them, or if as we suggest, they could get in by rotation for a specified term of say six months at a time.

To this arrangement we know that there are several objections, and the regimental rejoinder usually is, to the effect that such a plan must inevitably lead to confusion and would lower the character of the shops, as regards the quality and out-turn of their work. This might be so at the outset, but we think that ultimately it would be decidedly advantageous, to have a number of men of any given trade prepared at a pinch to come in and carry out a large order ; and prudence would seem to suggest such a course, when the chance of changes by reason of death, invaliding, detachments, misconduct, etc., etc., is considered. The advantages appear to us to at least outweigh the objections, and it cer-

tainly seems fairer and more in accordance with the object, for which the institutions were originally started. Better we say to have ten or dozen men of each trade fairly skilful and handy, than two picked men who can and unfortunately for the most part do work up to exhibition standard. This leads us to consider whether on the whole the local and central exhibitions have been sources of *unmixed* benefit to the shops or not. We say most decidedly not, for while we most willingly acknowledge the utility of exhibitions in stimulating and rewarding the effects of skilled labor, of almost every conceivable kind, and from every branch of the service, and while we hear cheerful testimony to their success in developing and bringing together resources hitherto undreamt of, we feel compelled also to say, that they have, unsuspectingly no doubt, but still not the less unfortunately encouraged and fostered two failings, which from the very outset required repression.

Firstly, the tendency to subordinate useful practical labor to mere fancy work for Exhibitions and Bazaars ; and secondly, the tendency to over-estimate the value of all work turned out, and to affix ridiculous and frequently prohibitive prices upon nearly every article.

In connection with this subject, the remarks of the committee of the Soldiers' Industrial Exhibition, held at Lucknow in 1870, are so admirable, that we need offer no apology for inserting them, the italics being ours—

“ The prosperity of Regimental Workshops must, of course, mainly depend on the ready sale of the productions, *and the soldier workman must enter into fair competition with the labor of the country, and having so many advantages we should be able to produce articles as cheap as any native artificer.* When once it is established as a fact, that articles can be procured from Regimental Workshops as good, and at the same rate as may be current at the time, *there is hardly any limit to the extent to which they would be purchased, but at present there is no doubt that the reverse of this is believed,* and there the produce of the workshops is confined to the lines of the regiment. The committee observe, that the large sums awarded at previous Exhibitions have imbued the soldier with the idea that any article of workmanship he may send to the Exhibition is entitled to some reward as a matter of course. *It is most essential that so pernicious an impression should be removed, and that it should be clearly understood that the main object of the Exhibitions is to reward skilled labor of marked excellence.* There is no doubt that articles are often ‘made up’ for exhibition only, *with enormous prices put on them to give a false impression of their value,* and that such articles are sent year after year to the different Exhibitions. This the Committee consider should be prohibited, and articles sent only once for competition though in some instances they might be sent a second time for sale.”

The first failing is one which is no doubt difficult to deal with without damping the ardour of the workman, and checking the efficien-

cy of the shops. It requires much tact and judgment to decide to what extent the resources of a shop shall be directed, towards competing for prizes, and improving or upholding the reputation of a corps, without interfering injuriously or vexatiously with the ordinary routine and useful work. The tendency particularly in the case of regiments located near to the forthcoming Exhibitions, is to neglect or at least to postpone, or worse still to slur over, small orders from the station or barracks, in favor of elaborate articles intended to snatch prizes or fetch fancy prices ; and unquestionably the temptation to all hands from the President downwards is very great. Did the objection extend only to a period of a week or two, it would of course be trifling, but the construction of large carved tables, costly cabinets, inlaid office tables, etc., etc., involves the labor of months, and taxes the time and ingenuity of the men to such an extent, as to leave little time or taste for more common place and useful labor. If however it be deemed inexpedient to discourage this kind of emulation and the development of a high standard in upholstery and other trades, then let some of the extra hands whose employment we have above advocated be called in for the time being, to carry on the daily job work, and leave the picked men of their callings to proceed undisturbed with their Exhibition work.

In the first of the foregoing paragraphs, the Committee put their finger on the greatest blot connected with the shops, the erroneous estimate the British soldier forms of the value of his time and labor ; and the enormous price affixed to articles is the direct consequence of this overweening opinion of his own importance. We lately had occasion to get a small job done by a carpenter of a Regimental Workshop, who was a fairly good workman, and in all other respects an average specimen of his class. On the completion of the job we remonstrated against the exorbitant price charged, informing him, as was the case, that we had had an exactly similar job much better done the previous month by a native carpenter for less than half the amount. " Yes, Sir, said he, but you don't mean to compare my work with that of a native." Now, be it observed, that this soldier as such was in receipt of more than eighteen rupees a month from the State, and had all the tools furnished to him, whereas the native was of course working for his mere maintenance. " Ex uno disce omnes." This is the spirit which is so rife amongst military workmen, and which we maintain requires the utmost repression. It should be most clearly explained and emphatically impressed on the soldier's mind, that being struck off all or nearly all regimental duty, having food put into his mouth, clothes put on his back, a comfortable roof over-head, a good daily rate of pay, and all the necessary tools found for him, he has almost had in effect every morning before he enters the workshops, a fair day's wages for a fair day's labor, and should therefore most unquestionably, " Enter into fair competition with the labor of the country," and " be able to produce articles as cheap as any native artificers." In addition to this, it will not unfrequently be found in the present day, that the soldier workman is not more skilled than his native rival, and this more especially in the trade of carpenter and joiner. The demand for these latter has of

late years so increased in Great Britain, that a really high class workman will rarely be found to enlist and the army gets lads with a year or two's experience and that probably spent in one class of work only.

The remedy for this would probably be found in the establishment of "Shops of Instruction" at such hill stations as Kussowlie, Darjeeling, Wellington, &c. &c., to which really promising young tradesmen might be sent for a period of two years to perfect themselves in their respective branches under first class superintendency. There too might be carried out the suggestion as to the instruction of soldiers' children, embodied in the original scheme as submitted to Government.

The financial aspects of the workshops it is somewhat difficult to get at, but it is understood that most of them pay fairly well and some in the large stations remarkably so. We cannot but think that were the system to be made less exclusive, and a scale of payment graduated as to skill adopted, that the prices charged for articles could be very considerably lowered, and then there would be "hardly any limit to the extent that they would be purchased." At present the delay in turning out work, and the enormous price charged for it, curtails at once the usefulness and the prosperity of the shops; but these defects are being gradually remedied no doubt; and we trust that ere long the soldier workman will be able to enter into fair competition with the labor of the country.

FRED HENDERSON,
Captain, 107th Regiment.

III.

LIGHT INFANTRY CORPS.

It is proposed to consider the advisability of having in our army, special corps, formed for, and trained as Light Infantry.

In the first place let us inquire into the causes which seem to demand so great an advance in the selection and training of Light troops, as to call for the formation of special corps.

Secondly, we will turn our attention to the formation and training of the corps themselves, with a view to their being rendered capable of performing the difficult and important duty required of them.

In speaking of Infantry generally, Colonel Hamley says, "it exercises its influence in conflict in two ways, in firing on, and in charging the enemy. All its formations in battle have reference to one of these modes of action; the first defensive, the second essentially offensive."

Function of Light Infantry.

I think we may venture to assert, that in the main, the function of Light Infantry, or skirmishers, is solely to fire on the enemy, but more often perhaps as an offensive rather than defensive action.

With regard to the other manner in which Infantry in general exercises its influence in action, viz, "charging the enemy," Light Infantry ought to have but little to say, for although one of the greatest authorities of the present day, the German War Department, seems to advocate, by the mouth of Major Von Scherff, the advanced skirmishers joining in, if not actually leading the rush of assault, this disposition would be ruinous to a comparatively small army with, as is proposed, a select body of skirmishing troops.

Besides although Light Infantry may be often called upon to occupy a position vacated by the opposing side, occasions will be extremely exceptional in which it must be brought in immediate contact with the enemy.

We will not touch upon the formation and employment of large bodies in skirmishing order, but confine ourselves to the consideration of Light Infantry when performing its legitimate business, of covering advances and retirements of other bodies of troops, without regard to the actual tactical formation of the main body, for whatever may be the formation selected, the movements of that body must be covered by other troops acting as Light Infantry, purely and simply.

It may be that this duty is performed, by the first of a series of waves of men in extended order, but there is no reason at present to think that this will often be the case. But however that may be, the work has to be done by somebody, and the arguments for and against the formation of special corps, will be equally strong, whatever the order of battle may

be ; conformation of ground and the "penchant" of the General will have a great deal to say to the order of the main body, but the work of the skirmisher varies but little.

Up to that moment in which the power of the main attack can be brought to bear on the enemy, all the aggressive, the actual "fire-battle" will have to be carried on by the skirmishers,* for it is well known, how comparatively incapable, troops on the move, in any formation, are, of inflicting actual loss on the opposing side, and what damage is done, is inflicted by the skirmishers, and those only in the front rank.

In nearly every instance recorded of positions being carried, even under the old state of things by troops in formation, unassisted by distinct bodies in skirmishing order to carry on the *ad interim* fighting, the success has been owing, more to the want of morale of the troops acting on the defence, than to the aggressive power of the attack.

In the "Operations of War" our attention is drawn to the remarks of Jomini on the subject of positions being carried by moral force, but Colonel Hamley takes for granted that the defence had been "already thinned and shaken by the enemy's fire," that it was in fact a "shattered array."

Effect of introduction of Arms of Precision.

But as men become, as they will, every day more and more skilled in the use of the rifle, and as they are supplied with better and better weapons ; so will they in proportion, become more difficult to shake, when acting on the defensive.

The great advance of late years in the manufacture of small arms has done little, in proportion, to increase the fire-power of troops on the move, for the increase in the accuracy of the weapon demands a corresponding advance in the manner of using it. The amount of cool deliberation necessary, to make the most of the improved weapon, cannot be looked for, amongst troops on the move ; nor in the majority of cases, will opportunity offer for its exercise.

But to troops on the defensive, for the most part stationary, with time and opportunity for deliberate aim, confident from being more or less under cover, the improved weapon has assuredly given a great increase of power.

It is an old military adage "that the ineffectual fire of skirmishers is an actual advantage to the enemy, by increasing their confidence ;" if this was true formerly, how much more likely is it, to prove so now, working as the attacking skirmishers have to work, with much heavier odds against them, and this too, over, twice or three times the amount of ground, as formerly.

* We are treating, of course, the action of Infantry alone.

The Light Infantry Soldier.

To give the skirmisher of the attacking side, any chance whatever of overcoming in any degree the odds against him, he must be very far above the general average, both as a marksman and a Light Infantry soldier.

For at the distance at which skirmishers generally have to engage, no chance shooting will avail, besides the shooting powers of each individual must be of such a nature, as not only to insure such respect for his performances, as to necessitate an attempt at his destruction, but actually to preclude the enemy from paying much attention to the main attack, although such an attack is expected, or even observed.

To utilise his powers as a marksman, he must be sound not only in limb but in wind.

What would his ability in the use of the rifle avail, if on arriving at his cover, he finds himself so distressed, by his efforts to keep up with his more hardy comrades, that for all power to harm the enemy, he might just as well be armed with an old musket as an arm of precision.

It appears to be a nearly accepted fact, that for the future, in the majority of instances, the advance of skirmishers, will have to be made, by a succession of rapid rushes from cover to cover, or in the open, for certain distances. How trying this is when conducted over even the ordinary run of country, is known to all who have experienced it, and it is hardly likely that the enemy would select ground favorable to the advance of the opposing skirmishers.

The skirmisher must have an eye to country. To give without taking must be his maxim, in fact, he must never let the enemy have a chance at him.

Without sufficient intelligence to enable him to appreciate what is going on, or what is expected from him, he will be sure to commit the common fault of firing at that portion of the enemy, which may happen to be in his immediate front ; for this grievous fault is not realized as such, by one soldier in ten. The fact that a shot, although it may prove a fatal one, is thrown away, if not directed on any particular portion of the foe, does not strike the ordinary soldier, and it will be no easy matter to convince him, that his accurate aim has done absolutely nothing, towards furthering the success of the day.

Without high training and more than the average amount of sharpness, he will not be content to fire on men 400 yards away, when he sees other bodies of the enemy within a shorter distance of him and perhaps invitingly conspicuous.

Nor will he be able to restrain himself from joining in the first enticing rush which may be made in his neighbourhood. He must be educated to see the advantage of plying the enemy with the contents of his rifle, thereby preventing them from pouring, at their leisure, a des-

tructive fire, on that body of his comrades, which it is his duty to nurse, consoling himself at not being able to join, in the closing movement on the enemy, by the knowledge of the importance of the part he is playing ; a much more important one indeed, than if he had reinforced with his presence, a body, which in the opinion of his superiors, was already sufficiently strong, to perform the work cut out for it. He must also bear in mind, that in the case of a reverse, it is to him chiefly, that his foiled comrades will look to help them out of their difficulty, and afford breathing time for the renewal of the assault.

These are some of the items, which go to prove that a Light Infantry soldier ought to have more skill and intelligence, than is to be met with, as a rule in the ranks.

The men are there, but at present, under the existing order of things, diffused throughout the army. They want collecting together into corps to enable their being put through a special training, so special indeed in its nature, that the attempts to put the whole of the infantry of the army through it, would be not only useless, but inadvisable.

The opponents of this system of selected corps may argue, that other nations like ourselves have given them up, except in name, and that skirmishing manœuvres are performed indiscriminately by all corps alike; but I don't think this will prove, on inquiry, to be the intention of the different powers, although late events would seem to justify the supposition ; besides were this so, it would only prove that corps were too much on a par, to render their being told off for particular work, a matter of consequence.

But in the late war, the force of circumstance had more to say to the indiscriminate use of Jägers, Schützen corps and ordinary line battalions, than anything else.

Unless we are ill-advised, the German authorities yielded, somewhat weakly I cannot help thinking, to a pressure that was brought to bear by the members of these special battalions, who complained that in late wars they had not reaped their full share of prowess and honor and glory; if I may coin such a word, by being treasured up and taken care of. They must have forgotten when they rebelled against this nursing, that their individual value was the reason, and that far from being a matter for complaint, their *amour propre* ought to have been strengthened, by this conclusive evidence of their extraordinary value.

But the pell-mell manner in which corps were cast into action as they happened to arrive, was the chief cause of the promiscuous, and probably totally unpremeditated, use of corps, which again was a sequel to drifting into unpurposed actions.

The consequence was, that men, whose extreme value had been the cause of a fostering care being exercised regarding them in previous wars, were squandered as if their places could be filled at a moment's warning, in performing duties, which could equally well have been performed by the most ordinary men in the army.

The German Army happened to be able, owing to its great numbers, to get on without these men, but to us who cannot afford to make up by numbers for tactical errors, the loss would have proved ruinous; indeed this is the strongest argument against the organizing special corps, that a mistake may cause the destruction of a whole corps of valuable men, who could not be readily replaced; we must trust the bungle will not be made.

In the Prussian army proper, the Jäger battalions certainly were not intended to perform the ordinary duty of skirmishers, which was left chiefly to the Schützenzug of companies, and naturally, as only one battalion of these highly trained men was attached to each army corps of twenty-five battalions.

But in the Saxon, Bavarian and Wurtemberg Army Corps, each brigade of Infantry had its Jäger or Schützen corps, and the reason why these corps were not kept for the purpose for which no doubt they were originally intended, was as already mentioned, one of circumstance rather than choice.

The Italians evidently intend, if training will do it, to make the Bersaglieri the pattern Light Infantry of Europe. Thanks to the Sardinian element, suitable recruits are forthcoming, and although the training of these special corps may be, and probably is, unnecessarily severe, especially in the matter of quick marching, still I cannot help thinking, that they have got a great start of the rest of Europe in the manner of training light troops.

The personal appearance of individuals of these corps leaves nothing to be desired.

We all know that Napoleon turned out admirable Light Infantry, according to the then existing standard, in a very short time, by devoting his attention to the training of his conscripts simply as light troops, without endeavouring to impart to them the steadiness of his old and well-tried battalions; and he used these troops only for the purpose for which their training fitted them.

Amongst ourselves, the fact of the existence of Light Infantry companies and corps, showed that formerly at all events, the impossibility of training the whole of our Infantry as Light infantry was an accepted fact, and, it seems hard to believe that the introduction of the rifle, and the compiling of a drill book to be used by all the infantry alike, should have obviated the difficulty, evidently experienced in times not very remote; and the bestowing of the title of "Light Infantry" on certain corps, as a reward for good service in the field, is a proof that the original Light Infantry regiments, had by their smartness, made for themselves a reputation, entirely their own.

The very complicated Light Infantry drill of the period, had Infantry much to do with the abolition of the special training of Light Infantry corps and companies, by causing the authorities to jump at any

opportunity of doing away with so intricate a system of manœuvring, and such an opportunity no doubt, the introduction of the new drill at that time afforded.

It cannot be asserted, that whole armies are now composed of such peculiar materiel, as to do away with a necessity which was formerly recognised.

Are we not now relatively in the same position, as when all were armed with the smooth-bore ; does not the same necessity for having certain bodies of men trained for a certain purpose, and perhaps specially armed, still obtain ?

I have endeavoured to prove that the necessity not only exists, but is considerably increased.

Formation of Special Corps.

The system of selected corps, rather than companies, seems to have several advantages.

In the first place, it appears undesirable that some companies of a regiment should be trained in one way, and some in another.

Secondly, the employment as one body, of companies drawn from different regiments, is apt to create confusion and sometimes leads to petty jealousies.

Thirdly, outpost duty is notoriously better performed by a regiment than by different detachments from different corps.

Fourthly, the present Rifle and Light Infantry regiments afford excellent foundation to work upon, and when these corps have become so thoroughly trained, and the vacancies in them judiciously filled up as they occur, we shall have the greater portion of the body of the Light Infantry, ready for service, before let us hope, the necessity for its use arises. Other corps, to make up the quota of one Light Infantry battalion to each brigade, could be selected either on account of being linked to a Light Infantry battalion, or for some other good reason.

Selection of the men.

The men selected for Light Infantry corps, would not necessarily be fine men, they would be selected for certain qualifications, for which their comrades were not so conspicuous, although probably possessed of others quite as valuable. Strong undersized men, sharp witted, who have already proved themselves marksmen of the first order, would probably be the men selected for these regiments, and they would be drafted straight from the centre where they had been enlisted, and to a certain extent trained. And no men would be allowed to volunteer into these corps at any time who had not the necessary physical qualifications. This selection of men would not press hardly on the rest of the infantry of the army, or diminish in any way, its *esprit de corps*, for a member of any corps is hardly likely to think less of his own, because

certain men, mostly rather undersized perhaps, were sent to particular corps, on account of certain qualifications, which however valuable for special purposes, did not necessarily go towards the making of the only, true soldier. No, he will, as heretofore believe, as he ought to believe, that his own corps is without exception, the best in the Service. But even supposing, that at first, the change was really productive of some slight jealousies, necessity alone would have caused the innovation, and private feelings would have to go to the wall in matters in which the public weal was considerably concerned.

Training of the Regiments.

The course of training though which these regiments would be put would probably include the different drills, as at present practised by the army but in quite different proportions.

First in order of importance would come musketry instruction, consisting of the present course with the addition of a course at moving, targets. A modification of the system now pursued at the camp at Bruck would answer this latter requirement.

Secondly, Running drill. The drills for this would be of a much severer nature, than those at present practised, and would be of almost daily occurrence, and carried on over various kinds of country.

Thirdly, Drill. Skirmishing drill, including the manœuvring of one half of the battalion against the other, over unknown ground if possible, would be the rule, battalion exercise, a rare exception and for the simplest manœuvres only. Outpost duty, firing of villages, &c. would be included in the across country manœuvres.

Fourthly, Gymnastic Exercises.

Shelter Trench exercise, is not I think necessary for Light Infantry corps, owing to the impossibility of keeping the tools close at hand in an advance under heavy fire, and the rarity of the occasions on which any use for the tools would arise. Also, the skirmisher should be taught to depend simply on the natural cover, which may fall in his way, and which his expertness will enable him to utilise to the utmost. Occasions which necessitated the employment of shelter trenches, would hardly be those, which would call forth the good qualities of the Light Infantry soldier as a skirmisher, or on which he would be likely to be employed, except as an extreme measure; he would rather be retained for the impending advance or retreat when his energies would be fully taxed, and powers of endurance tested to the full.

A. VALLINGS, CAPTAIN,

1st Punjab Infantry.

IV.

INDIAN ARMY REORGANIZATION WITH RESERVES.

It is with the greatest diffidence that I venture to submit the following views on the very important subject of the Reorganization of the Native Armies of India.

2. I am led to believe that this subject is now under the consideration of Government; and as I feel sure that His Excellency the Commander-in-Chief will, if he should be unable to approve, at any rate not visit with displeasure, the honestly formed opinions of any member, however undistinguished, of those Armies, I am encouraged to lay these brief pages before him, conscious that they are dictated solely by an earnest desire for the welfare and efficiency of the Service to which I have the honour to belong.

3. Should the views herein displayed be approved of, I venture to hope that they will be found to possess the following recommendations, *viz* :—

(a.) Of indicating that military expenditure may be diminished.

(b.) That the practical strength of the Army may be largely increased through the creation of a numerous and efficient Reserve, which would be capable of almost instantaneous assembly; while, at the same time, the number under arms and receiving full pay in times of peace would be diminished.

(c.) That while the aggregate strength of the Army for use against an enemy would be improved and rendered capable of being more rapidly set in motion, the political dangers which may be foreseen from its present constitution would be guarded against and reduced to a minimum.

(d.) That the contentedness of the Army, and the share of efficiency due to that feeling, would be assured.

(e.) That a much better class of Recruits would be attracted to the Service.

(f.) That an *impetus* would be given to the breeding of horses suitable for Native Cavalry Remounts.

(g.) That a considerably greater number of British officers than at present would be allotted to each regiment and battalion, without imposing additional expense on the State.

(h.) That a system of promotion among British officers of Native Troops would be inaugurated, which would be sufficiently rapid to prevent worn-out Officers from being placed in regimental command, without, at the same time, unduly advancing inexperienced men.

(i.) It is believed that real *esprit de corps* would rapidly spring up and continue under the proposed system.

4. While strongly impressed with the probability of the foregoing

advantages resulting from the proposed system, I do not conceal from myself that greater experience than my own may see valid objections to it which may have escaped my scrutiny, and I do not claim for it entire originality, as the desirability of localizing and segregating the component parts of the Native Army has been frequently discussed, while the necessity of a strong and efficient Reserve is at the present day universally admitted.

5. I cannot preface these pages better than by quoting the following passage from Colonel Chesney's "Indian Polity,—a passage whose eloquent words are still more true now than at the time they were written, but whose final and disastrous verification, it is to be hoped, will be rendered impossible by a timely recognition and avoidance of the dangers to which they point:—

"The moral, above all others, to be learnt from the Mutiny, was surely that the different military bodies which we are compelled to keep up should be as distinct as possible from each other. It was this isolation of the Madras and Bombay Armies from that of Bengal which prevented their being contaminated by the spirit of mutiny. The same cause, among others, kept the Punjab on our side; the bulk of the Bengal Army was not recruited from that country. But this advantage has now been discounted. The Punjabee levies have been converted into regiments of the Bengal Line, and take their regular tour of duty throughout the whole country from the Peshawur frontier to Assam; Sikh sentries now garrison Fort William side by side with Poorbeahs from Oudh and Behar; and, as a consequence, the Sikh soldiery, in the opinion of many who are intimately acquainted with that people, are fast losing their special characteristics as a separate race, and are becoming, so to speak, citizens of the world.

"The result may be, that if, on the recurrence of such an emergency, we have occasion again to invoke their help, we shall find their sympathies transferred from our side to that of their brother-soldiers. If the Bengal Army has to be put down a second time, it will be an army representing every race of people from the Ganges to the Indus, and there will be no second Sikh Army to look to. Not only will the lesson to be learnt from 1857 have been all thrown away; we shall have artificially created a second difficulty, of precisely the same kind, without reserving the means of overcoming it."

6. I need not reiterate, and I am incapable of doing justice to the numerous and cogent arguments which have been advanced by various reasoners in support of the above opinion; but I will take it for granted that their force is admitted, and will plunge *in medias res* at once, submitting, as succinctly as possible, the salient points of the Scheme for Reorganization which I have presumed to entertain, and trusting, in the sequel, to enforce, as best I may, the advantages to be expected from it.

7. I will confine myself to a consideration of the Army of that Presidency with which I am best acquainted; for, if the propriety of the

reforms which I advocate is conceded, there could be no difficulty in extending them to the Armies of Bombay and Madras, thereby creating a limited number of distinct *corps d'armée*, each complete in itself, and all under the immediate orders of His Excellency the Commander-in-Chief. I would therefore propose—

(1.) That the whole of the Native forces serving in the Bengal Presidency, together with those under the orders of the Supreme Government and of the Government of the Punjab, be divided into such number of separate *corps d'armée* as may seem advisable to the highest authority.

(2.) Presuming, for the sake of illustration, that four such *corps d'armée* were decided on, that they should be named respectively the Punjab Frontier *corps d'armée*, with its head quarters at Rawul Pindee; the Northern with its head quarters at Meerut; the Central with its head quarters at Allahabad; the Southern with its head quarters at Calcutta.

(3.) That these *corps d'armée* should be complete in themselves, with a proportion, adjusted to their probable requirements, of British artillery, cavalry, and infantry.

(4.) That these *corps d'armée* should be divided into divisions, and sub-divided into brigades of such strength as His Excellency the Commander-in-Chief may consider best.

(5.) That each brigade be composed, so far as practicable, of soldiers of the same tribe or religion.

(6.) That each regiment be recruited from its immediate neighbourhood, and be ordinarily stationed at its own permanent head quarters.

(7.) That brigades, when ordered on service be, whenever practicable, moved *en bloc*, their places being immediately filled by the reserve battalions, whose formation will be presently dealt with.

(8.) That in place of the present system of reliefs, annual camps of instruction be formed by Commanders of *corps d'armée* under orders from Army Head Quarters.

(9.) That every soldier be enlisted for general service, and bind himself to proceed, whenever required, on foreign service, either with his own corps or detached from it.

(10.) That every soldier of good character who, on expiration of 14 (fourteen) years' service, may be considered fit by a Medical Board, be given the option of joining the reserve regiment or battalion if unpromoted.

Note.—If considered advisable, the following rule may be inserted here :—"That unpromoted men may be specially permitted, at the discretion of Commanding Officers to remain with the ranks for a further term of service limited to 5 (five) years.

(11.) That soldiers considered in any way unfit for the Reserve after 14 (fourteen) years' service be discharged with a gratuity of 6 (six) months' pay.

(12.) That non-commissioned and commissioned officers be passed into the Reserve under special rules.

(13.) That each soldier admitted into the Reserve be re-attested binding himself to appear at muster whenever called upon, and to serve whenever and wherever required.

(14.) That from these re-attested soldiers be formed Reserve battalions, bearing the same names as, and supplementary to the corps in which their members originally served.

(15.) That the whole of the Reserve battalions and regiments be called out annually for drill during one month ; and mustered at the head quarters of the active or first line battalions corresponding to them.

(16.) That service of 12 (twelve) years with the Reserve, completing 26 (twenty-six) in all from date of first enlistment, relieve the soldier from further liability to duty, and entitle him to pension equal to, in the case of infantry, full reserve pay, and in the case of cavalry dismounted reserve pay, with such small addition as may be considered advisable.

(17.) That in case the Reserve battalion should fall below the strength of the Line battalion, soldiers of less than 14 years' service be permitted to volunteer for it, provided that they do not become eligible to pension till after 26 (twenty-six) years' service in all from date of first enlistment.

(18.) That all arms and ammunition be issued by Government, and remain the property of the State. That the arms and ammunition of Reserve soldiers be deposited at Regimental Head Quarters, and issued when the Reserves are called out for drill or active service.

(19.) That Reserve pay, for the rank and file, when not called out be fixed as follows :—

Cavalry.....	{ Mounted, Rs. 14 (fourteen)
	{ Dismounted, Rs. 4 (four.)
Infantry.....	Rs. 5 (five) per mensem.

(20.) That pay at full Line rates be issued during the month's annual training, and for all such periods as the Reserve troops may be actually called out under arms.

(21.) That mounted Reserve pay be contingent on its recipient keeping a serviceable horse, such horse being inspected and vouched for quarterly by the Adjutant of Reserves, and being ridden by its owner during the annual drills.

(22.) That a "Chunda Fund" be established in each Cavalry Reserve Regiment, to which the same rules shall be applicable as are in force with regard to the Chunda Funds of Line Regiments, with reductions in the subscriptions proportionate to the smaller value of the Reserve horses.

(23.) That the value of a Reserve horse be fixed at Rs. 120 (one hundred and twenty).

(24.) That a cavalry soldier leaving the Line regiment for the Reserve, on Rs. 120 (one hundred and twenty) be deducted from his regimental Chunda Refund, and invested in the purchase of a suitable horse.

(25.) That on a reserve soldier presenting himself (and if a cavalry man, his horse in good condition) during the first fifteen days of each quarter to the Adjutant of Reserves, he be entitled to receive his pay for the preceding quarter.

(26.) That a cavalry Reserve soldier be liable to be dismounted and to receive dismounted pay should his horse not be in good condition, or be in any way injured through his owner's fault.

(27.) That should a Reserve soldier fail to present himself at Regimental Head Quarters during the first fifteen days of any quarter except in case of certified sickness, or other cause proved to be beyond his own control, he forfeits the whole of his pay for the preceding quarter.

(28.) That should he so continue to absent himself during two successive quarters, his name be struck off the rolls.

(29.) That in the event of a Reserve soldier becoming physically unfit for further service before 3 (three) years passed in the Reserve, he be discharged with a gratuity of one years' nett pay : if after that period, he be discharged with pension equal to nett Reserve pay.

(30.) That a British officer of Subaltern rank be specially appointed to each regiment and battalion as Adjutant of Reserves, and that he be placed in charge of all documents connected with the Reserve Corps : that he be required to keep accurate muster rolls of the men and horses ; to be personally responsible for their correctness ; to prepare quarterly Pay Abstracts, and to submit vouchers for all payments made by him.

(31.) That the junior captain of each regiment or battalion be authorized to exercise general supervision over the Reserve Corps, and to be the channel through whom every matter connected with its welfare and efficiency would be brought to the notice of the Lieutenant Colonel Commanding, whose authority would be paramount at all times, subject to superior control.

(32.) That the whole or any part of the Reserve forces of all or any number of the *corps d'armée* be liable to be called out and embodied, whenever such a step may seem advisable to the supreme Government.

(33.) That failure of any Reserve soldier to appear at muster on the date fixed when called out for drill or service be considered and punished as desertion.

(34.) That the establishment of British Combatant Officers for each Regiment of Cavalry be fixed as follows :—

1 Lieutenant Colonel, Commanding.

1 Major 2nd in Command.

- 4 Captains, of whom the three Seniors would command squadrons as at present, while the Junior would exercise general supervision over the Reserve.
- 7 Subalterns, of whom 1 would be Adjutant of the Line Regiment.
 - 1 Adjutant of the Reserve Regiment.
 - 1 Quarter-Master of the Regiment.
 - 3 Attached to the Regiment.
 - 1 To the Reserve Regiment ; making a

Total of 13 (thirteen) British officers.

(35.) In the event of the Line Regiment being ordered for service, the Lieutenant Colonel, Major, 3 Senior Captains, and 5 Subalterns, or 10 officers in all, would accompany it, leaving the Junior Captain, the Adjutant of Reserves, and 1 Subaltern to take charge of the Reserve in case it should be called out.

(36.) That the establishment of British combatant officers for each battalion of infantry be fixed as follows :—

- 1 Lieutenant-Colonel, Commanding.
- 1 Major, 2nd in Command.
- 5 Captains, one to each 2 companies, while the Junior would exercise general supervision over the Reserves.
- 8 Subalterns, of whom 1 would be Adjutant of the Line battalion.
- 1 Adjutant of the Reserve Battalion.
- 1 Quartermaster.
- 5 Placed under the orders of the respective Captains, making a

Total of 15 (fifteen).

(37.) In case of war, 12 officers would accompany the Line battalion, leaving, as in the case of the cavalry, 3 to superintend the Reserves, and to recruit for the absent battalion.

(38.) That the names of the British combatant officers of every two regiments of cavalry and battalions of infantry taken numerically be borne on one roll for the sake of regulating their regimental promotion.

(39.) That these officers be interchangeable between the two corps.

(40.) That promotion regimentally be by seniority, except in the case of inefficient officers, who may be passed over by their juniors on the authority of His Excellency the Commander-in-Chief.

(41.) That the regimental command be limited to five years, except in cases of special war services, or special qualifications, when the term might be extended to eight years.

(42.) That the retirement of a Lieutenant Colonel be compulsory on relinquishing a command, on such pension as may be decided upon, unless the officer be selected for higher employment.

(43.) That such retirement carry no claim to prospective off-reckonings, which would be awarded in a limited proportion to highly distinguished officers.

8. Having thus given a rapid sketch of the changes which I would propose in regimental interior economy, I will now proceed to deal with the question of numbers and expense.

9. There are at present in the Bengal Presidency, excluding the Hyderabad Contingent, the Guide Cavalry, and the two squadrons of the Deolee and Erinpoora Irregulars, 19 Regiments of Bengal Cavalry, 5 Punjab Cavalry, and 2 of Central India Horse, or altogether 26 Regiments of Cavalry; and of Infantry, excluding the Hyderabad Contingent, the Guide Infantry, and the Local Levies, such as the Bheel and the Bhopal Corps, 45 Battalions of Bengal Native Infantry, 4 Goorkhas, and 11 of the Punjab Frontier Force, or 60 Battalions in all,

10. It is evident, and, indeed, has been proved by experience, that in case of war only a portion of this force is available for active service and that portion can with difficulty be spared owing to the want of troops to fill its place; while it is impossible during a campaign to supply casualties, in consequence of the non-existence of the means of recruiting. The number of British officers also is admitted to fall short of the requirements of native troops on active service.

11. I hope to show, that with a considerable reduction of military expenditure during times of peace, it would be quite easy to detach on service a larger body of troops than heretofore, more efficiently, because more fully, officered; while the place of every battalion employed would be immediately filled by one of at least equal strength and equal discipline.

12. In addition to these advantages, the expense of the whole scheme would be much less during peace than the present establishment, and during war would not be greater than what would inevitably have to be incurred in supplementing the existing forces; while it would admit of sudden retrenchment to a peace footing at the first moment that such reduction became expedient.

13. And, lest at first sight my proposal might seem to reduce the number of fighting men immediately available, I would beg that it may be clearly borne in mind that the number which I would allot to the First Line, is really only half of that which would be under arms within a few hours of the necessity arising; and that, from the nature of the case, the Reserve Corps would not be in any way less efficient in drill or discipline than those by whose side they would rally.

14. I would propose, then, to substitute for the present 26 Regiments of Cavalry and 60 Battalions of Infantry, a force of 16 of the for-

mer and 40 of the latter, each supplemented by its Reserve Corps, thereby representing an actual and instantly available strength of 32 Regiments of Cavalry and 80 Battalions of Infantry.

15. I trust that the proposal will carry with it its own recommendation if I can succeed in showing that its realization would not impose additional expense ; and it appears that the clearest way in which I can make this evident is to submit the tabulated statements (*vide* Appendix), which are believed to accurately represent the constitution and cost of the present regiments and of the proposed ones, with the total expense monthly and annually of the whole force.

16. It will be observed in these statements that I have not interfered in any way with the pay, as at present fixed, of Native officers, or with the allowances on account of hospital and educational establishments, although it is probable that the element of localization in the proposed scheme would permit of a certain reduction under the two latter heads, and possibly under the former one.

17. I have ventured to re-distribute the pay of the various grades among the British officers on a plan which slightly increases the incomes of the junior ones, while it is by no means illiberal to the seniors.

18. I have provided a sufficient allowance for the office of the Adjutant of the Reserve Battalion, and for the repair of the arms belonging to it.

19. And I have, in the proposed scheme for the Cavalry branch set apart extra allowances for Drill Instructors and Rough-riders, in the urgent want of which, commanding Officers and Adjutants will doubtless agree with me.

20. Otherwise there is no difference between the pecuniary items of the two systems as regards the First Line.

21. It will be seen that the total annual cost of a force, which I trust will be considered not only numerically, but in many other ways superior to the present one, would be actually slightly less, without taking into consideration the collateral savings which might be made, and without touching on the question of the present unwieldy Pension List.

22. But it is precisely with regard to its effect on the Pension List that I would base one of the chief claims of this scheme to favourable consideration.

23. I need not fear contradiction when I assert that a very large number of the soldiers of the proposed Reserve Corps would, if the present system were continued, be pensioners, giving no services to the State. Besides, except in rare cases, under the proposed organization soldiers would not come on the Pension List till after 14 years in the Ranks and 12 in the Reserve ; whereas now (witness the Annual Invaliding Returns) an immense number of pensions commence at 15 years' service.

24. Zealous Commanding Officers and Adjutants, with the co-operation of equally zealous Medical Officers, force many men on to the Pension list who do not quite come up to their notions of smartness and efficiency ; but there is little doubt that a large proportion of these so-called invalids would be perfectly fit for the Reserve if there were any way of getting rid of them from their Regiments without altogether depriving the State of their services.

25. I am therefore justified in assuming that the Pension List would be reduced to a minimum, and that a very large saving would accrue under this head, bearing out my assertion that the proposed scheme would, as a whole, effect a considerable economy in military expenditure.

26. I trust that so far I have made out my case. Let me now proceed to point out some of the collateral advantages which are to be hoped for from it.

27. I will not enter into the political question as to the advisability of massing in regiments or brigades men of the same castes or religious persuasions, for although my own opinion is strongly in favor of such a course, it is clear that the principle of the localization of the troops would equally admit of the mixed-class system.

28. Nor will I insist on the probability that disaffection, if it should unhappily again arise, would in all likelihood be much more limited in its extent, and capable of being more easily stamped out ; but I think it does not require any strong arguments to prove that a much better class of recruits would be attracted into the Service than those who now find it worth their while to leave their homes, for what, to natives of India, is virtual banishment.

29. It is a matter of common regret, especially in the Cavalry branch, that it is daily becoming more difficult to obtain recruits of good social position. Indeed, with some regiments, in place of the long string of " Oomedwars," who formerly were content to wait patiently for their turn to be enlisted, it has become necessary to detach non-commissioned officers, sometimes to great distances, for the purpose of beating-up recruits : and the men so obtained rarely have sufficient money to purchase their " Assamees," but have to be assisted in doing so from the " Amanat Khata Fund" to the partial crippling of that Fund, and its diversion from its more proper uses as laid down in the Cavalry Standing Orders.

30. One of the minor of these uses is defined to be the advancing at 6 per cent of private loans to men of the regiment, of whose deposits the Fund is composed. But it is clear that if it is drawn upon to any extent to enable non-subscribers to buy their " assamees," less will be available for those who have paid up their subscriptions in full.

31. The distaste above referred to on the part of young men with capital and of good family, to enter the ranks, would, it is believed, entirely disappear if a military career were open to them, which would admit of their passing their service during ordinary times within a

short distance of their homes, and in regiments where many of their comrades would belong to their own villages, and some probably to their own families. Wealthy zemindars would no longer object to send their sons into the Army if they were relieved of the dread of being separated from them by vast distances for an indefinite number of years.

32. On the contrary, it is probable that the Army would be looked upon as offering a most eligible career for the very stamp of men who now decline to enter it, and that they would then be just as eager to secure enlistment as now they are averse to it.

33. A zemindar with many sons would probably not object to the cost of some of them being taken off his hands by the State, while the certainty that after 14 years they would be able to rejoin the family circle with a better help to their incomes than the present pension, and with only a remote chance of being called out in case of war, would not tend to make the prospect less pleasing.

34. The ranks would then always be filled with young men in the very prime of life, from 20 to 34 years of age; and the Reserve would be formed of seasoned old soldiers, whose average age between 34 and 46 would not unfit them for the fatigues of war; while there can be small doubt that the anticipation of full pay, as well as of a little fighting, to either of which soldiers, whether white or black, are rarely averse, would cause them to "fall in" with great alacrity at the earliest summons.

35. It is believed that the proposed organization would help towards the solution of another problem which is duly becoming more embarrassing, namely, the adequate supply of Cavalry Remounts; for it is clear that under the hitherto existing system of reliefs, involving frequent changes to distant stations, regiments are quite unable to make their own arrangement for the breeding of remounts, but have to seek, as best they may, at scattered fairs, and under the disadvantage of mutual competition, a precarious and yearly more expensive supply of horses.

36. Even the foals which happen to be thrown by mares in the lines are necessarily sold within a few weeks of birth, and the mares thus artificially rendered unproductive to the service still continue to be so when "cast" either from age or other causes; for they are sold to the highest bidder, and all trace of them lost; whereas, under the proposed system, even if it were not thought advisable to establish Regimental Breeding Studs, there would be small difficulty in arranging for the produce of any regimental mares being secured to the corps; and many a mare that is now cast and sold to outsiders would find its way to the villages of the sowars, and there give birth to two or three foals, which could be cheaply kept, and in due time, if pronounced fit be passed into the regiment, with benefit both to their owners and to the Service.

37. It is also highly probable that the creation of a permanent local market within a short distance of their doors would encourage not only the Reserve sowars to turn their attention to the breeding of horses, but that the trade would be found profitable and attractive to many of the landed proprietors.

38. It is hardly necessary to point out the great facilities that would be offered for the establishment of Regimental Breeding Studs. The experiment might well be tried at first in a few selected districts, and if found to answer might be extended as experience would suggest.

39. With regard to the distribution, the increased numbers, and proposed system of promotion among British officers, I shall offer no remarks, as many abler men than myself, notably Colonel Chesney, have already exhausted all that is to be said in favour of a regimental system of promotion, and of increasing the number of British Officers with Native Troops.

40. I have also left untouched the question of the future supply of these Officers, for it is beyond the bounds of the task which I have set myself, and it would be presumptuous in me to express my opinion as to whether Her Majesty's Regiments should continue to be tapped to feed the Indian Army, or whether a local body of officers should be formed to perpetuate, under a new name and under the shadow of the Imperial flag, the memory of their gallant predecessors, the servants of the Honorable East India Company.

41. I must crave indulgence for the terse and rapid manner in which I have endeavoured to submit the foregoing views. Although hurriedly written, they are not the result of hurried thought, but the shortness of the time at my disposal, and my anxiety to bring them to notice, while the subject of Indian Army Reorganisation is believed to be engaging the attention of the highest authorities, must plead my excuse for the want of elaboration which greater leisure might have supplied.

42. In spite of these shortcomings, I have felt it my duty to bring forward a proposal, which will, I trust, meet with the approval of many of my brother-officers ; and the realization of which would be hailed with delight by all ranks of the native soldiery ; while it is hoped that it would promote the welfare and efficiency of the Service, at the same time that it benefited the finances of the State.

In continuation of the foregoing paper it has occurred to me that it would be well to supplement it with a few remarks, dealing with some of the principal difficulties which present themselves in connection with it, and which, in such a short and concise essay, I was unable to notice.

The most obvious objections to the carrying out of my proposal may be recapitulated in the form of the following queries :—

1st. Are localized troops to be depended upon on occasions of political or religious excitement in their neighbourhood ?

2nd. Large portions of India do not produce one man who would enlist, or who, if he did enlist, would be worth having; yet in these countries we are obliged to keep strong bodies of troops. How can this difficulty be met consistently with any scheme for localizing separate *Corps d' Armée* ?

3rd. How could the garrisons of places beyond our Frontier, like Gwalior, be supplied; and what arrangement could be made for troops on foreign or distant service, as for instance in Burmah ?

4th. Would the reduced number of First Line Regiments and Battalions be sufficient to carry on the ordinary Peace duties, which are admittedly heavy even for the present larger number of corps ?

5th. Would it be practicable to keep the Reserve at full strength, seeing that it would be entirely supplied from the First Line ?

6th. Would the Reserve Army be dangerous, or be likely to be tampered with ?

There are, doubtless, various other considerations which will occur to different minds as bearing, with more or less force, against the practicability, as a whole, of the proposal which I have set forth; and with regard to its details many modifications will probably be suggested by those who possess greater knowledge and experience than myself: but it is believed that the above queries are so obvious, that a more or less satisfactory answer to them may reasonably be demanded. I have therefore endeavoured in the following pages to supply such an answer, not without hope that it may be found at least partially to effect its object, and to show that the difficulties in the way of establishing separate local *Corps d' Armée* are not insuperable.

First—With regard to the danger of sympathy between troops and people on occasions of religious or other excitement.

There are few large districts where the population is so homogeneous that it would be difficult to balance against each other Brigades or Regiments of totally diverse tribes or religions. In many cases propinquity of residence has not tended to assimilate or bring into accord the members of different classes. For example, in the Punjab Pathans and Sikhs can be recruited side by side, yet would willingly act against each other.

Similarly, over almost all British India, Hindoos and Mohamedans live intermixed, but with no real social cohesion.

A seemingly obvious consideration, and yet one which is, in reality, generally overlooked, is that at no time under British rule has the experiment been tried in its integrity of keeping these religious classes entirely apart in the Army.

They have at all times been thrown together ; so that, even nominally Mohamedan Regiments, such as Skinner's Horse, contained a proportion of Hindoos.

At the time of the mutiny Hindoo and Mohamedan having been for generations welded together in our Regimental system, went or stood together. It seems reasonable to suppose that if there had been any real and clear-cut separation regimentally between them, their interests would never have assumed even the appearance of identity ; and bodies of purely Hindoo troops, if such had existed, who had been carefully shut off from contact with Mussalman intrigue, might have acquired *esprit de corps* of a kind which, far from linking them more closely with their former conquerors, would have made them eager to show their prowess against them.

The Moghuls made considerable use of levies from amongst the Hindoos ; but, unlike ourselves, they always kept them in bodies entirely distinct from their Moslem comrades.

The result showed their wisdom ; for the Rhatore Rajpoots, who always claimed the right of fighting in the van of the Moghul army, earned, till alienated by religious intolerance, a reputation for courage and devotion to the cause of their masters which has been rarely equalled and never surpassed.

Not to mention other instances of their heroic fidelity, it can never be forgotten that Hindoo armies under their own chiefs, Rajahs Toder Mull and Maun Singh, re-established in Bengal and Behar the authority of the great Akbar over his revolted Moghul forces, nor that the Rajah of Jeypore conquered ; for the same monarch, the province of Cashmere, and reduced its Mohamedan king to the position of a noble of the Court of Delhi.

These historical instances strongly support the policy of keeping apart, in a military point of view, the two great religious classes of India ; but it is open to us still further to subdivide them, and by encouraging, rather than by blending, diversity of creeds and races, to make them powerless against ourselves, while jealous and watchful of each other. Among Mussalmans the proverbial hatred between Shias and Sunnies could be made a source of strength to the Government, for as there is no cohesion between these two sects, intrigues which might influence the one would have no effect upon the other ; and it is no improbable surmise, that if their members were enlisted into distinct Battalions, the cry of "Deen ! Deen !" might at some future crisis be raised by Mohamedan soldiers charging, under British leaders, their own co-religionists.

Although, with our position as a dominant alien race, the danger can never be entirely obviated of Native troops sharing the popular excitement in troublesome times, history is full of examples of troops acting with vigour and perfect fidelity to their colours against their own

countrymen, in repressing outbreaks which had originated on religious as well as social or political grounds ; and even in India instances are not wanting to show that military discipline gives birth to a distinct class-feeling which takes the place of former ties, and, in fact, almost becomes a species of religion in itself. Witness the conduct of the 2nd Rohilla Cavalry, which was disbanded in the Peace reduction of 1820-21, " having previously greatly distinguished itself in the Mussalman insurrection at Bareilly,—when, true to their salt, the men acted without hesitation against their own countrymen, co-religionists, and, in many cases, their personal friends and relatives."—(*Calcutta Review*.) Witness also the behaviour of the Khas Rissala of Skinner's Horse in 1803 against three times their number of their own mutinous comrades: "The 300 men ordered to cross the Jumna instead of doing so marched off towards Koonjah. On this the Khas Rissala saddled their horses, lit their matches, and called on their Commander to lead them against the deserters who were bringing such disgrace on the corps. Skinner readily put himself at their head, and soon came up with the deserters, whom he endeavoured by remonstrance to recall to a sense of duty. The reply was a matchlock ball which killed his horse, upon which his own followers, although the odds were three to one against them, dashed gallantly at their opponents, and completely routed them, leaving ninety dead on the field, their own strength being only a hundred, of whom ten were killed and several wounded."—(*Calcutta Review*.) Colonel Grant, Commanding the 15th Madras N. I., informs me that in the end of 1868, or beginning of 1869, a Regiment, composed entirely of men recruited in and near the large town of Palamcottah, in Tinnevely, very few of whom had ever been under fire, when called upon to repress a riot among their own towns-people, obeyed without hesitation the order to fire upon the mob, and thus, at the cost of many lives among their own neighbours and relatives, put an end to a demonstration which was provoked solely by religious fanaticism, a fanaticism in which in all probability many of the soldiers themselves would have shared had not devotion to their colours supplanted their former habitual state of feeling.

The above instances tend to show that where *esprit de corps* has been carefully cultivated (and *esprit de corps* can never be more thoroughly developed than in purely class Regiments), the danger of the Military so far forgetting their duty as to side with the country-people in religious or other disturbances, is comparatively small : while even if the popular excitement did penetrate through the barriers of discipline, the knowledge that a neighbouring brigade was composed to a man, of soldiers, whose habitual feelings on religious matters were not only unsympathetic but probably hostile, would exercise a peculiarly calming effect over any body of troops who might otherwise be inclined to give trouble ; and who would be not unlikely to do so if they felt that through the working of the "general mixture system" they could safely count upon the co-operation of at least a portion of their comrades in other regiments.

I am fully impressed with the difficulties enunciated in the second

and third queries at the head of this paper ; and although I hope to show that they can be successfully met without disturbing the principles of my scheme, I must frankly admit that my proposal, in the hard and terse form in which it originally stood, did not provide for all the varied conditions of Indian Military necessities.

In such a vast Empire, held or occupied under so many different tenures, there must always be, in addition to the main Army, a limited number of auxiliary forces adapted to the special circumstances of some of the outlying portions. There always have been, and unless the whole peninsula came under the direct Government as apart from the Protectorate of British power, there always must be, such off-shoots, so to speak, from the regularly organized Forces. Therefore no completely consistent scheme, applicable similarly to every detail of the whole Native Army, could possibly be formed ; but in spite of this drawback it is believed that such an organization as has been proposed, if its details are modified to suit special needs, would be found to meet the requirements of the main military system, and would prove itself to be a strong backbone on which the requisite branching ribs might be laid. Taking the locality proposed to be occupied by the Southern *Corps d'Armée* as a typical one with respect to its barrenness of recruit-giving classes, and recognizing the necessity of providing it with a sufficient body of troops on the same model as other districts, which are capable of supplying their own soldiers, I will venture to make a suggestion which is rather an amplification than a modification of the original proposal, and which I trust, will be found on examination to have recommendations of its own, apart from the general questions of the localization of the Troops and the creation of a Reserve ; while, *mutatis mutandis*, it is equally applicable to places beyond our Frontier, like Gwalior, and to foreign or distant countries, like Burmah. It is this :—

Let those *Corps d'Armée* which are most eligible in point of locality and of recruit-productiveness, be called upon to supply the required garrisons.

Thus, let each Regiment of the selected Army Corps consist of three instead of two Battalions,—one localized at its permanent Head Quarters, the second on Foreign or distant service, and the third, or Reserve, equal in strength to both the former.

Let the first seven years of a soldier's service be passed with the first, the next with the second Battalion, including one furlough of six months' duration ; and then let him return to his home and the Reserve Force.

In this way, although the actual Regiments would always be stationary, there would be constant interchange of their members ; and the corps on distant service, being composed of thoroughly trained soldiers, would always be kept in the highest condition of efficiency. The different *Corps d'Armée* would still be kept entirely distinct, with their own Staff, their own Commanders, their own Garrisons ; and while the South

ern Bengal Army Corps would draw its soldiers from classes thoroughly adapted for Military service, it would possess a Reserve in common with those portions of the Army more fortunately situated. It is true that the portions of the Reserve allotted to the second Battalions would be at a comparative distance from them, and in case the whole Army of the First Line were ordered on active service could not reach their posts so quickly as their comrades who would replace the first Battalions, but the delay would not be very serious, and would not nullify the fact that a Second Line would at all times be ready to step into the place of the First Line, and release it for active operations against an enemy.

In these circumstances, of course, the Reserve of each Regiment would have to be divided into two bodies, each with its own three officers, and allotted to its respective Battalion, while its annual month's training would take place at the Head Quarters of the First Battalion. It is not necessary to point out what opportunities that month's assembly would afford the British officers of practice in the handling of large bodies of troops: each Battalion during that period would be a Brigade in itself.

It is also evident that this arrangement would admit of the proportions of the classes of whom the Army would be composed being adjusted at the discretion of Government. For example, if it were thought desirable to have a large proportion of Sikhs, the Regiments localized in Sikh districts could be formed on the plan now suggested, while those recruited among less soldierlike populations could be restricted to the limits of one active and one Reserve Battalion.

Under this scheme the resources of purely British Territory would be amply sufficient for the whole Native Army. But, as at present, many good recruits are supplied by Native States, and as their services may be considered too valuable to lose, I may be permitted to remark that I cannot see how the proposed system of Reserves would make these men less anxious to serve "the Sircar Angrez."

For instance, in Bundelcund, where my Regiment is at present quartered, I am assured by the Political Agent that any number of Recruits could be obtained, under the Proposed System, among the subjects of Native States. The only practical difficulty would be the legal one, as regards our right to the services of the Reserve soldiers while inhabiting their own villages in Independent Territory; or rather, perhaps, the want of any direct executive means of compelling their prompt attendance when required. But surely this difficulty would exist more in theory than in practice; for, if we claim authority over aliens when serving with the colours, as we now in numberless instances undoubtedly do, we could reasonably assert similar authority over attested soldiers, whose period, passed in the Reserve, would resemble a furlough more than anything else. Besides, it is more than probable that pecuniary considerations would prove quite strong enough to ensure the punctuality of these men in responding to the mustering summons.

In answer to the fourth query, I may explain that I have in my Pamphlet detailed sixteen double Regiments of Cavalry, and forty of Infantry, in order to bring direct expenditure to nearly the same figures as at present. But I have indicated the large saving which would accrue in the Pension List under the Proposed Scheme. This saving I have no data to enable me to estimate, but it is probable that it would be considerable, and would allow a certain number of additional troops to be borne on the Rolls without swelling the total expenditure beyond its present bounds.

Besides, the very fact of the non-existence of a Reserve is in itself a cause, indirect, yet potent, of duties falling heavily on some portions of our present Army, especially on those which guard the Frontiers. As things now are, when Frontier troops are wanted for work, they are compelled, at great sacrifice of strength, to form their own Reserves, or else to delay active operations till supports can arrive from a distance, thereby giving time and opportunity to hostile tribes to mature their plans of defence; or, if overawed by the magnitude of the preparations, to secure delusive terms of peace after the British Government has been put to great expense and trouble; whereas, if the lesson were once clearly taught that a considerable force could suddenly be launched upon them without leaving our base exposed to attack, it is more than probable that it would not require to be repeated.

However, even admitting that the reduced Pension List and the saving in "Off-reckonings" would allow of a certain increase in the number of Troops; and that the existence of the Reserve would tend to lighten the duties of the Frontier Forces, there remain garrisons, like that of Calcutta, where the existing detail of duties is so heavy that it could clearly not be performed by any less number of Battalions than at present. But these garrisons are very exceptional, and there is room for doubt whether much of their work, in the way of furnishing guards and countless orderlies, could not be equally efficiently, and more economically performed by Police.

The fifth query at first sight seems to propound rather a formidable difficulty; but it will be found to vanish on the consideration of the probable working of Rule 17.

With regard to any danger to be anticipated from the Reserve Army being tampered with, I may remark that its teeth would be effectually drawn by its arms being deposited in the charge of Government, and this safeguard could easily be strengthened by a provision that the arms in store should be made over to the care of a Commissary of Ordnance, and guarded by British Troops.

In conclusion, it may be remarked that the proposed scheme would make it feasible and safe to arm the Native Troops with Sniders, when the Europeans shall have been supplied with the Henry Martini, or any improved form of weapon: for, by keeping large depots of ammunition at a few arsenals, it would become quite easy to entrust the active

Battalions with only the limited supply necessary for the annual Musketry Course, while the Reserve would not possess any ammunition or weapons whatever.

The present improved means of communication would enable the stores to be forwarded in small quantities as wanted. Thus would the strength and efficiency of the Native Army be greatly increased, while, at the same time, it would be deprived of all power of successful mutiny, for its weapons would be totally useless without the proper cartridges, and the production of these cartridges is quite beyond the mechanical skill, as well as the mechanical resources, of the Natives of India.

A. R. D. MACKENZIE, MAJOR,

3rd Bengal Cavalry.

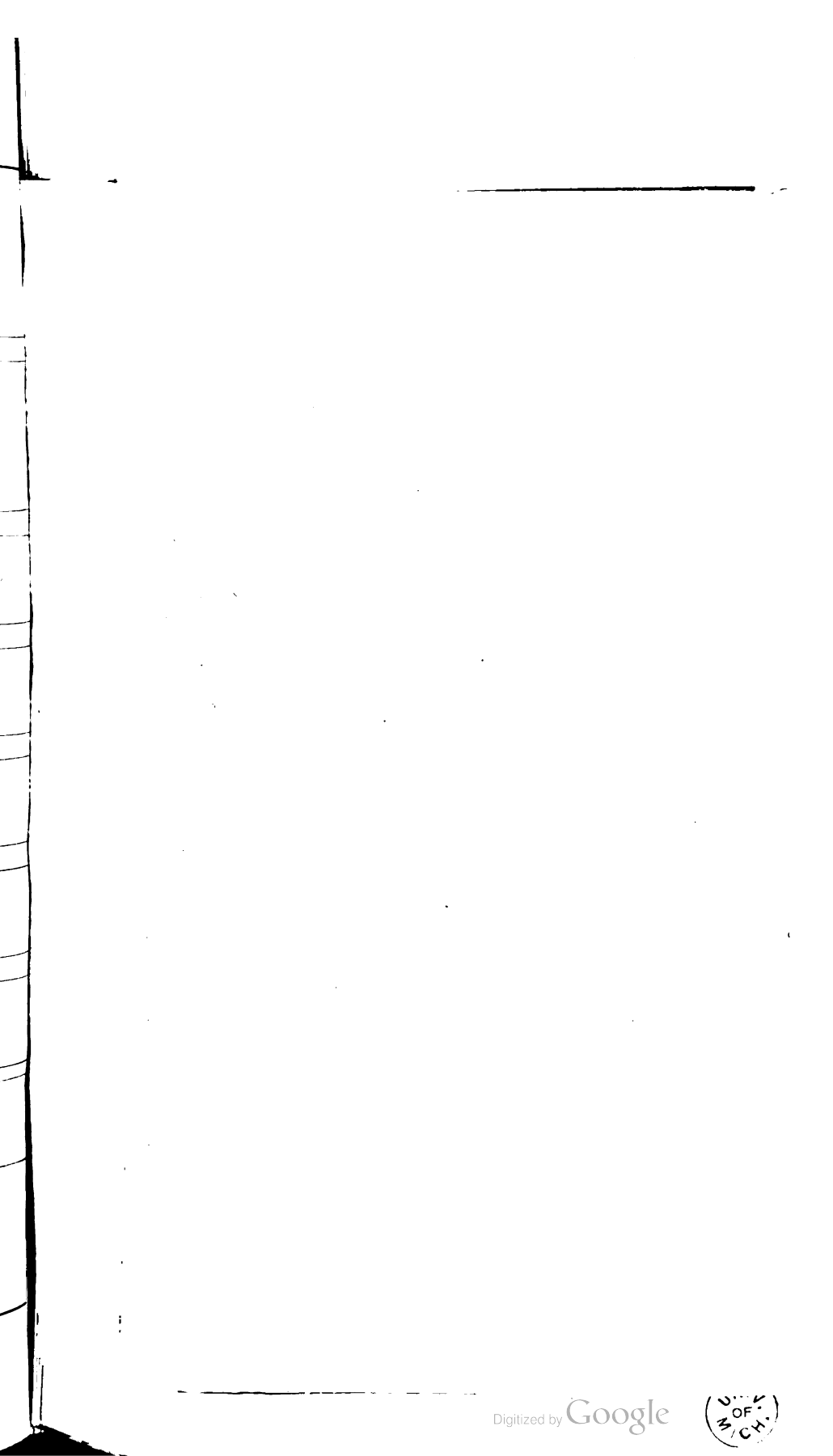
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77.

A TABULAR STATEMENT showing the Annual Cost of Present and Proposed Organization of the Native Army.

ORGANIZATION	CAVALRY.		CAVALRY RESERVE.		INFANTRY.		INFANTRY RESERVE.		Total Cavalry Expenditures.		Total Infantry Expenditures.		Grand Total of both Cavalry & Infantry.		REMARKS.
	Rs.	A.	Rs.	A.	Rs.	A.	Rs.	A.	Rs.	A.	Rs.	A.	Rs.	A.	
Present	66,79,882	8	...	...	90,36,607	8	...	...	66,79,882	8	90,36,607	8	1,57,16,490	0	
Proposed	46,83,120	0	14,23,872	0	75,64,800	0	20,42,880	0	61,06,992	0	96,07,680	0	1,57,14,672	0	
Decrease	5,72,890	8	
Increase	5,71,072	8	
											Decrease...		...	1,818	0



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ORGANIZATION	CAVALRY.		CAVALRY RESERVE.		INFANTRY.		INFANTRY RESERVE.		Total Cavalry Expenditures.		Total Infantry Expenditures.		Grand Total of both Cavalry & Infantry.		REMARKS.
	Rs.	A.	Rs.	A.	Rs.	A.	Rs.	A.	Rs.	A.	Rs.	A.	Rs.	A.	
Present	66,79,882	8	...	...	890,36,607	8	...	...	66,79,882	8	90,36,607	8	1,57,16,490	0	
Proposed	46,83,120	0	14,23,872	0	0,75,64,800	0	20,42,880	0	0,61,06,992	0	96,07,680	0	1,57,14,672	0	
Decrease	...	...	...	...	...	...	...	...	5,72,890	8	...	...	...	...
Increase	...	...	...	...	...	...	...	...	...	...	5,71,072	8	...	...
											Decrease...		...	1,818	0

D TOTAL Cost of RESERVE FORCES, showing 11 Months at RESERVE RATES and 1 Month at FULL RATES when called out for DRILL.

RANK.	No.	Rate of full Pay per mensem.		Total Full Pay for 1 month.		Rate of Reserve Pay per mensem.		Total Reserve Pay for 1 month.		Total Reserve Pay for 11 months.		Grand Total of Full Pay and Reserve Pay for 11 months.	Total for 40 Regiments.	REMARKS.	
		Rs.	A.	Rs.	A.	Rs.	A.	Rs.	A.	Rs.	A.				
INFANTRY.															
Subadars	8	67	0	536	0	32	0	256	0	2,816	0	3,352	0	The grades of full Reserve Pay of native officers of equal rank have been equalized in this statement, as it is considered that the sums allotted are ample.	
Jemadars	8	30	0	240	0	20	0	160	0	1,760	0	2,000	0		
Havildars	40	14	0	560	0	9	0	360	0	3,960	0	4,520	0		
Naicks	40	12	0	480	0	8	0	320	0	3,520	0	4,000	0		
Sepoys	600	7	0	4,200	0	5	0	3,000	0	33,000	0	37,200	0		
Total for Regiment,												51,072	0	20,42,880	0
CAVALRY.															
Woordie Major	1	150	0	150	0	40	0	40	0	440	0	590	0		
Ressaldars	3	200	0	600	0	40	0	120	0	1,320	0	1,920	0		
Ressaldars, &c.	3	120	0	360	0	40	0	120	0	1,320	0	1,680	0		
Jemadars	6	60	0	360	0	25	0	150	0	1,650	0	2,010	0		
Duffidars	54	38	0	2,052	0	17	0	918	0	10,098	0	12,150	0		
Trumpeters	6	34	0	204	0	14	0	84	0	924	0	1,128	0		
Sowars	384	27	0	10,378	0	14	0	5,376	0	59,136	0	69,514	0		
Total for one Regiment ...												88,992	0		14,23,872	0
Total for 16 Regiments												..	0		

V.

SOME NOTES ON RAILWAYS.

BY CAPTAIN H. COLLETT,

Quarter Master General's Staff.

THE principal services required from Railways during war are—1st the concentration of the troops for the opening of the campaign; and 2nd, their subsequent supply—two operations which are perfectly distinct, and which require separate consideration. I propose, first, to deal briefly with these branches of this subject, and then to discuss certain practical details connected with the working of Railways in the circumstances of war.

In Europe, where the lines are double, the rolling-stock ample, and the railway administrative staff numerous and efficient, the concentration of armies is effected with extraordinary rapidity. In 1866, the Austrians brought up their armies from Italy to the Danube, a distance of about 350 miles, at an average rate of 12,000 men and 1,000 horses per diem; the total number being 120,000 in ten days. The Prussian staff estimate the time necessary to transport a complete *corps d'armée** at from six to nine days; but in the great concentration of the German armies in 1870, the transit of an army corps was effected in from three to six days. The number of military trains run during the twenty-four hours was from fourteen to sixteen, though occasionally it was increased to fifty; and the concentration of 400,000 men on the Rhine, with their proportion of horses, guns, and war materiel, from distances up to 500 miles, was actually accomplished in fourteen days.

It is important to remember that this most successful example of the utilization of Railways was entirely due to German forethought. The project of concentration was drawn up by the Prussian staff in the winter of 1868-69, and all the necessary preparations, down to the smallest details, were made beforehand. The marching and time-tables for each separate regiment had been worked out, and as new lines were constructed, these tables were altered and re-arranged so as to be kept up to date.

In India, where the lines are, with a small exception, single, and where the railway servants are unaccustomed to the management of heavy traffic, such rapidity of concentration is, of course quite impossible; and it would not be prudent to reckon on the despatch of more than 12 trains in the 24 hours.

* A Prussian army corps, when mobilised, numbers about 32,000 men and 800 officers (28 battalions, 8 squadrons, 96 guns), with 1,600 men, 1,600 horses, 229 wagons in the ammunition column; 70 men, 117 horses, 13 wagons in the pontoon train; and 1,480 men, 1,250 horses, 195 wagons in the train battalion, i. e., commissariat and hospital equipment. (The army of the North German Confederation, page 58.)

We have unfortunately had no experience in this country in the railway transport of large bodies of troops, but an elaborate scheme has been drawn up in the Quartermaster General's Office, in which it is shown that 11,500 men (10 battalions, 15 squadrons, 36 guns,) could be collected, from stations south of Lahore, at Rawul Pindee (supposing the broad gauge railway to be continued to that station), within 200 hours of the receipt at army head quarters at Simla of the order for the concentration. The troops would be provided with their field establishments, camp equipage, and 200 rounds of ammunition per man, but would be without any ordnance, reserve, or commissariat stores. The movement would cover 794 miles of railway travelling.

It is evident that the advantage to be obtained from railway transport increases in proportion as the number of troops is small and the distance great, but diminishes as the number increases and the distance lessens. For example, it is obvious that a brigade might be transported two months' march in a single day ; while, on the other hand, an army corps might march a short distance quicker than it could be conveyed by railway. It will, therefore, be always a subject for calculation whether it will be a saving of time to march your troops or move them by rail. There were some notable instances during the late war, when the disregard of the French staff for this consideration led to divisions being despatched by rail to places which they could have reached more rapidly by ordinary march.

The Germans, whose experience in the movement of great masses of troops by railway is unequalled, have deduced a short law, by the application of which it can be readily ascertained whether it is more advantageous to rail a given number of troops a given distance or to march them.

The rule is as follows:—

For double lines.—It is only advantageous to rail when the number of miles is $2\frac{1}{2}$ times the number of thousands of troops.

For single lines.—It is only advantageous to rail when the number of miles is $4\frac{1}{2}$ times the number of thousands of troops.

For instance, 50,000 men will be conveyed quicker by a double line for distances up to or exceeding 125 ($50 \times 2\frac{1}{2}$) miles than they could march, but on a single line the distance to be travelled must be at least 225 ($50 \times 4\frac{1}{2}$) miles to render the use of the railway advantageous.

Another, and perhaps more convenient, way of stating the same rule is to say, that with a double line it is not advantageous to rail troops when the proportion is greater than 400 ($\frac{50000}{125}$) men to the mile, and with single lines when the proportion is greater than 222 ($\frac{50000}{225}$) to the mile.

Colonel Sir Garnet Wolseley, in his pamphlet on the use of railways in war, states that in England, where the railway administration is the most perfect in the world, and the amount of rolling-stock practically unlimited, it would be advantageous to rail an army corps (27,000

men) any distance over 45 miles ; this is equivalent to saying that the number of miles need only be $1\frac{5}{8}$ th the number of thousands of troops, or that the proportion of bayonets and sabres to be sent should not be greater than 600 to the mile.

It has been calculated that in India it would only be advantageous to rail troops when the number of miles is 6.4 times the number of thousands of men, supposing they could march at $15\frac{1}{2}$ miles a day ; if the rate of marching were reduced to 12 miles a day, the number of miles to be travelled must be 4.8 times the number of thousands of troops.

This rule is, however, applicable only to the broad gauge railways; on the metre gauge lines, now being constructed, the number of miles to be travelled must be no less than 16 times the number of thousands of troops, supposing they could march $15\frac{1}{2}$ miles a day, and 12.6 times the number of thousands if the rate of marching be reduced to 12 miles a day.

This rule illustrates, in a very striking manner, the superior advantages possessed by the broader gauge railways for military purposes.

It must be remembered that when "troops" are mentioned in the above examples, it means an army fully provided with its due proportion of guns, cavalry, staff, &c., but does not include the provision trains, transport animals, or ordnance reserve stores.

The concentration of a large army, such as the Prussian in 1870, is the most complex of all railway operations, as it involves combinations of different lines, movements of troops by route march, and their collection from every point of the compass.

Whenever the necessity for such a concentration becomes probable or even possible, it is essential to success that a scheme for the transport should be carefully prepared beforehand. The chief points to be considered in elaborating such a scheme are :—

1. Rolling-stock—amount required—arrangements for collection of—capabilities of—transfer of, if necessary, from one line to another.

2. The extent to which ordinary traffic can be suspended. In Europe, where large cities are entirely dependent on railways for their food-supply, this is possible to only a limited extent ; but in India civil traffic might be entirely stopped on emergency, without causing much public inconvenience.

3. Rate of travelling—stoppages—time required for loading and unloading—intervals between trains. This last consideration practically measures the carrying power of a line.

4. The relief of the pressure on particular points by the adoption of circuitous routes.

5. Selection of halting places *en route*—of the stations for embarking and disembarking troops—provision of suitable accommodation at such points.

It must be borne in mind that the embarking and disembarking powers of a line must be equal; it is no use despatching twelve trains in the 24 hours, unless you can unload them in the same time at the point of arrival. If this is not possible, a block will occur, and the whole scheme fall through. It is also indispensable that sufficient carts or transport animals be provided at the point of disembarkation, otherwise the station will very soon get crowded with men unable to carry away their ammunition, camp equipage, or baggage. In a large operation the disembarkation may be facilitated by sending some brigades to points within one or two marches of the place of concentration, or by utilizing branch lines where troops may be embarked or disembarked, without interfering with the principal stations on the main line.

In all movements by railway it is desirable to keep the military units complete during the operation; brigades and divisions should, if possible, be despatched entire, with their proper proportion of cavalry, guns, engineers, staff, hospital, and commissariat equipment, ordnance stores, &c. &c. It is always convenient to run the same carriages through from end to end, but the engines and engine-drivers should be changed. It has been laid down in Europe as a rule, that it is never desirable, under whatever pressure, to use both the sets of rails on a double line for movement in the same direction.

Colonel Hamley has remarked that the effect of railways in modifying the conditions of war is in nothing so important as in the supply of armies, for it enables a General to dispense with the enormous transport trains, without which he was formerly immoveable, and largely increases the area from which food and forage can be collected.

As an illustration of the powers possessed by railways for this kind of service, it may be mentioned that for some time during the siege of Paris one line, running 12 to 14 trains a day, fed the Prussians, transported immense quantities of artillery and siege materials, and brought up reinforcements averaging from 2,000 to 3,000 men a day.

In Germany it has been found that one train carries one day's provisions for an army corps, which is equivalent to saying that it does as much work in 24 hours as 3,000 wagons with 6,000 horses. We have had no experience in India in supplying armies from a distant base by railway, and are consequently without any reliable information on the subject.

Among the minor uses of railways for war purposes may be reckoned—

1. The transfer of fractions of an army from one part of the theatre to another.

2. The rapid bringing up of reinforcements at critical periods.
3. The removal of sick, wounded, and prisoners.

The first two operations are similar to, but simpler than, the concentration of an army. Generally speaking, rapidity of movement will be the most important consideration.

The last two points are closely connected with that organization of the resources of a line without which the regular and certain supply of an army in the field is impossible. As no nation in the world has attained such perfection in this department of war as the Prussians, a sketch of the system they have adopted cannot fail to be useful.

The railway communications of Germany are, for military purposes, controlled by the joint action of three "commissions," or, as we should call them, "committees." These are—

I.—The central commission.

II.—The line commissions.

III.—The *etappen* commissions.

The first, the central commission, is permanently constituted, though it only receives the power of action during war. It consists of a general officer as president and five members, *viz.*, two officials of what correspond with our Home Office, and Board of Trade, and three military staff officers nominated by the Horse Guards, War Office, and Control Department. The commission meet occasionally at Berlin during peace time, to consider and advise the Government on any questions which may arise respecting the war uses of railways. When war threatens, it sits in permanence, and receives from the chief of the staff the general scheme proposed for the concentration of the army at strategical points, which it examines in detail with reference to the condition and capabilities of the several lines of railways. The commission also selects the principal halting-places for the troops, and draws up instructions for the guidance of the two subordinate commissions.

Two members of the central commission, *viz.*, the staff officer from the Horse Guards and the Board of Trade official, form an executive sub-committee to carry out the measures which have been decided on. When concentration has been effected, and the armies are in the field, this sub-committee accompanies the army head-quarters, and is invested with the entire control of the railway system of the country.

The line commissions are strictly subordinate to the central commission. One is appointed for each line, and they consist of two members, a staff officer and a superior railway official (Traffic Manager). These commissions do not exist during peace, but are appointed on war being imminent, when it is their business to fill up for their own lines the details of the general time-tables and routes received from the central commission, and communicate the necessary instructions to the military and railway authorities concerned.

Each commission sits at the principal station on the line and supervises all its arrangements. After the concentration is completed, they recast the train system and adapt it for supply. Sometimes the commission accompanies in the field the head-quarters of the army which the line under its control chiefly supplies.

The third, or *etappen* commissions, are local boards for the government of the principal railway stations. They consist of a field officer as commandant, a staff officer, a control officer, a railway official (the Station Master), and an official of the local civil Government. Their business is to supervise all the arrangements of loading and unloading trains, to forward troops or military stores, and to feed the men and horses *en route*, &c. The commandant is invested with supreme power within the limits of the railway station, and all officers passing through, whatever may be their rank, are bound to obey his orders. These *etappen* or station commissions remain constituted during the whole of the war at the principal stations, but are dissolved where, after the concentration has been effected, the station becomes of no importance.

The above is a rough sketch of that wonderful railway organization which first concentrated and then supplied the immense German armies of 1870, and which accomplished its task with the regularity and precision of a well designed machine.

It is evident that such a system, though admirably adapted to European requirements, could not be applied in its entirety to this country, though the principle on which it is based is sound, and, therefore, suitable to all circumstances. It would be a great advantage if the Government control over the Indian lines were centralised in one railway department with the Government of India, instead of being divided, as at present, among the railway departments of three administrations. If we were prosecuting a war on our North-West Frontier, the main line of communication would be *via* Bombay and not Calcutta, and it would be highly important to have the Great Indian Peninsula Railway under the same controlling authority as the East Indian and Punjab and Delhi Railways. If the railway administration were centralised, the functions of the German central commission could conveniently be discharged by an officer of the great railway department of the Government of India, an officer of the Quartermaster General's staff, and an officer of the Commissariat; no other members would probably be necessary. This committee should be permanently constituted, but should meet only occasionally, and should perform duties analogous to those of the Central Commission.

One of the chief duties of such a committee during peace time would be to examine the projects for proposed railways, the drawings of rolling-stock, &c., and to suggest such alterations as would render either better adapted to military requirements.

Major Wilson, R. E., has given a very interesting account of the importance attached to these matters in Austria, where not only the

details of construction, but even the course of the line, are governed by considerations of military utility. Whenever a new railway is proposed, a report of its intended direction is submitted to the War Office, when a staff officer is sent down to examine the ground throughout its whole length, and to suggest any alterations in the position of the trace with regard to rivers and roads, or in the selection of sites for the stations, which may seem advisable for military reasons. The arrangement of the station buildings and their approaches are also subject to review, and at all the principal stations the Company are bound by law to provide sidings and platforms sufficient for the simultaneous loading of four or five military trains. Care is also taken that the railways do not interfere with the communication by the main lines of road ; and if a line has to cross one, it must be by a tunnel or bridge, and not by a level crossing.*

Officers of the staff are, in Austria constantly employed in travelling over the lines, revising the reports and information regarding their capabilities, suggesting alterations, and studying the technical details connected with the working of railways. A sum of £320 is granted each year to the railway section of the general staff for this purpose.

Detailed and corrected information on all Indian railways matters should similarly be collected in the Quartermaster General's Office, and complete schemes for the concentration of suitable forces at such strategic points as Rawul Pindee, Lucknow, Agra, Lahore, Mooltan, Allahabad, &c., should be drawn up and approved by the proposed committee, including arrangements for the re-garrisoning of those stations which it would be imprudent to leave without troops.

During war this committee, should as in Germany, sit *en permanence*, and to it should be entrusted the control of all the railway lines required for military purposes.

In India, where the railway system is as yet simple (though the narrow gauge lines threaten to make it the most complex in the world,) the formal constitution of "line commissions" does not seem necessary. The detailed time-tables, &c., would be drawn up by the Traffic Manager of a line in concert with the Assistant Quartermaster General in whose Division the head-quarter station of the railway was situated. It would, however, be prudent to place the train arrangement of the whole line in the hands of these officers, irrespective of the other military divisions through which it passed. Thus the entire G. I. P. line from Bombay to Jubbulpore would be administered from Bombay, the East Indian Railway from Calcutta, the Sind, Punjab, and Delhi Railway from Lahore. Line commissions would thus, in fact, be appointed, but there would be no need to create any special machinery for the purpose.

* This Austrian regulation contrasts curiously with Indian practice, which permits the placing of a narrow gauge railway actually upon the only road which connects the N. W. Frontier with the base at Lahore, the result being that the road is practically closed for the passage of troops by a line of railway which is itself unsuited for military purposes. It may safely be surmised that the project for this line was never submitted to professional criticism.

The *etappen* commission, though strange in name, is in reality familiar to the British service. No more complete line of *etappen* posts was ever established than by Lord Napier in Abyssinia. Looshai is another instance of its application, and indeed any long line of communication must necessarily be maintained on this system. Still, we have never yet had occasion to apply the principle to railways, though it would certainly be necessary during the concentration of any large body of troops. In India, where the *etappen* stations would necessarily be at large military cantonments, the arrangement would best be left to the local authorities. A Divisional General would be informed by the Quartermaster General that such and such a station in his Division had been named as a troop station, and the details of organization should be left to him.

To illustrate how the system could be worked in India, we will suppose that the General Commanding the Sirhind Division was told to make arrangements at Umballa and Phillour for the accommodation of troops : four troops trains a day to halt for two hours at each place for food, and four troop trains a day to disembark troops for six hours for rest. The General would appoint a military officer as station commandant, with an adjutant or assistant at each place ; the Deputy Commissary General at Umballa would be directed to nominate a commissariat officer, and arrange for the necessary supplies at both places ; the Assistant Quartermaster General would see to the camps being pitched, latrines dug, and temporary platforms constructed on the previously selected spots ; and the Deputy Surgeon General would organize a small field hospital at each place. The station commandant should, as in Germany, act with the Station Master, but be supreme within the limits of the station and adjacent military camps. The several departmental officials, commissariat or medical, should be strictly subordinate to him, and he should be held responsible that all necessary arrangements were complete, and that the troop service was conducted with regularity and despatch.

Colonel Hamley states that, during the preparations for the great struggle of 1870, " the French railways were scenes of disorder and obstruction, while those of Germany were acting with the unity and certainty of full rivers flowing towards the sea." It seems clear that unless we, too, elaborate some such system as that sketched above we shall fail to obtain full advantage from the military strength we undoubtedly possess in our rapidly increasing system of railways ; and prudence dictates that now, while we have the opportunity of leisure, a scheme for the war organization of railways should be prepared, which, when properly legalized, might be held in abeyance, to be applied when necessary, by the order of the Governor General in Council, to such lines, or parts of lines, as might be desirable. If this were done, both the railway officials and the military officers in command would know exactly what were their respective powers and duties, and the maximum use would in time of trouble, be at once got out of the railways : whereas if, as at present we trust to our luck, sudden pressure comes, the ordinary machinery

is thrown out of gear, nobody knows their proper place or duty, and half the value of the railways is lost, because we do not know how to apply the power we possess. It was said in former times that Providence favours the side with the big battalions, but in these days careful preparation and forethought exercise as great an influence on the course of events as numbers.

I will now consider what Major Colley, the Professor of Military Administration at the Staff College, terms the "executive details" of railway management, and will adopt his division of the subject, which is as follows :—

- I. Rolling-stock capabilities, &c.
- II. Composition of trains.
- III. Embarking and disembarking—time required, &c.
- IV. Platforms.
- V. Requirements of a Railway station, and duties of officer in charge.
- IV. Railway corps—organization of, &c.
- VII. Construction, repair, defence, and reconnaissance of railways.

I.—ROLLING-STOCK.

The capabilities of the vehicles in use on Indian railways for the ordinary movements of troops will be found in the official Transport Regulations, and need not therefore be repeated here; but there are some points connected with this branch of the subject which have not yet received the consideration which it seems to me they deserve.

Carriages for the conveyance of the sick and wounded.—We have already a few specially-constructed hospital carriages on each line, sufficient for present requirements, but obviously inadequate for the wants of an army in the field. It would, of course, be impossible to maintain at all times a stock of special vehicles, which might not be required once in a century, and it becomes necessary therefore to consider beforehand how ordinary vans and passenger carriages may most conveniently be altered into vehicles suitable for the conveyance of the sick. In Prussia the ordinary fourth class carriage is so constructed as to be easily converted into an ambulance carriage with 12 beds, and numbers were thus fitted during the late war.

Stretchers made to fit on a wooden framework provided with strong coil springs, are also kept in store, six or eight of which can be placed in a goods wagon, and which are very useful for the conveyance of the severely wounded. Where nothing better was available ordinary stretchers were suspended by ropes from iron hooks securely attached to the framework of the carriages, and it was found that the less severely wounded could be carried with fair comfort in common goods wagons, if a thick layer of hay were placed under their mattresses.

Both the French and Germans organized a system of regular hospital trains,* consisting of from 20 to 30 carriages for wounded men, variously fitted up, according to the requirements and available means, with store wagons for food and medical comforts, surgery cars for medical officers and attendants, kitchen, &c., and a permanently attached staff of doctors and hospital assistants. This system, which was borrowed from the Americans, seems to have been generally approved, and must have very materially decreased the sufferings of the wounded.

It may be noted here that, even with the best appliances, it is next to impossible to cook any thing, or even to boil water, while a train is in motion. It is, therefore, necessary to arrange for suitable food and hot water to be ready at convenient stations on the arrival of the hospital trains.

This subject of sick transport by rail calls for attention in India. Not a farthing of expense need be incurred, but we should have recognized plans, suggested by competent officers, and approved by authority for converting the different kinds of ordinary rolling-stock into hospital carriages; also tables, of the numbers each vehicle can contain, and instructions for the best means of obtaining the greatest possible comfort for sick and wounded men during the journey. This information should be embodied in the official Railway Regulations, which are now entirely silent on the subject. It might not be impossible so to modify the construction of some portion of the regular rolling-stock of Indian railway as to render it easily convertible into hospital carriages, and to oblige every company to maintain a certain number of such vehicles. There can be no doubt that all these matters should be thought out now in the leisure of peace, so that when the occasion arises, both staff and medical officers may know what to do, and the wounded may be saved the additional sufferings which bungling and ignorance, however well intentioned, must certainly cause.

* The following detailed account of a German hospital train may prove interesting :—

- 12 carriages for badly wounded, lying down arrangements, six beds to a carriage.
- 7 carriages for slightly wounded men, who are able to sit up.
- 1 carriage for medical officers.
- 1 " dispensary and other stores.
- 1 " kitchen.
- 1 " fitted with water closets.
- 2 " fitted with the apparatus for heating the other vehicles.
- 3 " for baggage.
- 1 " for officers' dining-room.

Two hundred patients were provided for in such a train, the establishment of which was 1 commandant (military officer), 2 surgeons, 2 assistant surgeons, 10 attendants on sick, 3 cooks, 4 soldiers to clean the carriages and to help in the attendance, and 2 Sisters of Charity.

The Prussians also fitted out ordinary luggage vans as "*lazaret wagens*," which held 12 litters, and were found to answer very well. The cost of conversion was only 33 thalers (nearly £5). Each carriage was provided with litters, mattresses, a stove, and other necessary furniture.

Transport of Men.—According to the official Railway Regulations, soldiers are all supposed to be conveyed in second, or at all events, third class carriages, but under the pressure of war it would certainly be necessary to use any vehicle the Traffic Managers could lay their hands upon. The best way of converting covered wagons, trucks, cattle vans, &c., into vehicles for the transport of men, and the number each will contain, should therefore be ascertained now, and recorded for future guidance. Open trucks, fitted with movable seats and backs, were largely used by the Germans in 1870 ; during the night, or on long journeys, the seats were unshipped and collected at one end, and straw was given for the men to lie down on. In India some sort of cover to the carriages seems essential, as much on account of the climate as of the dangerous sparks sent out by the wood fuel commonly used in the furnaces. Tarpaulins could perhaps be fitted as awnings, but the necessity should be provided for now ; so that if a staff officer had fifty trucks at his command, he might know exactly what to do with them, and how many men they would convey. Of course, even now they would be utilized in some rough and ready manner, but it would be a great convenience, both to the staff officer and to the troops, to have the thing cut and dried beforehand.

Camels form so large and so important a part of the transport with an Indian army, that the possibility of conveying them by railway ought to be considered. There does not appear to be any good reason why these animals should not travel in ordinary open trucks, but I do not know if the experiment has ever been tried. The fact might, however, be easily ascertained, and the knowledge would perhaps prove very useful some day.

The conveyance of horses is also a point requiring attention. The regulations merely inform us how many animals the regular horse box contains ; whereas it is well known that all the horse boxes in India would not convey a single brigade, and we should, of course, have to use cattle trucks or covered vans, which are indeed, much more convenient for the purpose, as horse boxes would lengthen the trains to a very inconvenient extent. Here, again, what is wanted is not to spend money, but merely to ascertain how cattle trucks can be most easily fitted up for horses, whether the doors of covered vans are sufficiently high to admit a saddled horse, and how they can best be partitioned off into stalls. In England the doorways of the covered cattle trucks used on some of the lines were found to be a few inches too low to admit saddled horses, and trucks of an uniform and suitable pattern are now being introduced by all the companies. This fact is another proof of the advisability for the plans of all railway stock being submitted for the opinion of a military committee, as practical experience could then suggest slight alterations, which would cost nothing to effect, but which would prevent the construction of vehicles almost useless for army purposes. In Prussia all the goods vans are designed to be easily divided by two barriers, so as to carry six horses, three at

each end, *standing lengthways*, as the *transversal* vibration of a carriage is considered bad for animals travelling long distances. Indeed, in that country every carriage, wagon, or truck is constructed on the uniform plan of being adapted for the conveyance of troops, horses, or guns, according to its nature. Special care on the part of the engine driver is necessary when a number of horses are being conveyed ; the stopping and starting of the train should be as quiet as possible, and the vehicles should not be bumped against each other. Whistling should be discontinued during the journey, or at least should be only done when necessary, and then as a gradually increasing sound, instead of the usual startling shriek. I have seen it stated that sand is preferable to straw for horse vehicles, as the latter soon gets kicked into heaps, but I am not aware if it has ever been tried. It is noteworthy that the Germans always have a few men with the horses in the vans standing at the animals' heads ; this is not the case in the British service, where the horses are left to themselves : it seems advisable that inquiry should be made which plan is the best. I see it stated in the newspapers that some of the cavalry horses got very much knocked about when travelling to Dartmoor for the late autumn manœuvres in England ; it is possible that this would not have been the case had a few of the men been with them.

The subject of the conveyance of supplies by railway has, so far as I know, received absolutely no attention in this country. The best way of packing bread so as to obtain the necessary ventilation ; the capacity of the several vehicles for cattle, sheep, flour, hay, straw, gram, fuel, &c., should all be ascertained and recorded. I do not believe there is a commissariat officer in India,—there is certainly not a staff officer,—who could give an accurate estimate of the number of vehicles that would be required to supply a force of 10,000 men for a week. There are no data for such a calculation in existence, and the Railway Regulations do not allude to the subject, yet it is most important that such information should be collected and made available for ready reference. There would be no difficulty in doing this now, and a little forethought may save a disastrous breakdown hereafter.

I am not aware if the Ordnance Department know what each pattern vehicle on the different lines in India can carry in the way of siege guns and their ammunition, or how many trains would be necessary to transport, say, a second class siege train, with 20 rounds per gun ; but if not already collected, such information should be at hand in every arsenal office in India. The Railway Regulations tell us something about the conveyance of field guns, but nothing regarding heavy artillery. So with the conveyance of small-arm ammunition, we are informed that a powder van carries five, six, or eight tons, as the case may be, but it would be convenient to know how many boxes of Snider ammunition this weight represents : or to put it

in another shape, how many powder vans would be required to carry 200 rounds per man in box for 10,000 men.*

It might also be convenient to know how ammunition could be most safely conveyed in other than the regular powder vans, and what special precautions would be advisable. There are only 78 powder vans in the whole of India.†

We might also now consider with advantage whether any reduction in the weight of the camp equipage, or number of followers which are thought necessary for troops taking the field in this country, could not be effected.

Colonel Wolseley calculates that in England an army corps, numbering 27,000 sabres and bayonets, with its proper proportion of guns, engineer equipment, &c., complete, but without any ordnance or commissariat stores or transport cattle, would require 3,870 vehicles of all sorts for its conveyance, which is at the rate of 6·97 sabres and bayonets per vehicle.

Calculations which have been made in the Quartermaster General's Office show that in India 1,716 vehicles would be required to convey 9,850 bayonets and sabres similarly equipped, which is at the rate of only 5·74 sabres and bayonets per vehicle.

From the above we find that in England 1,436 vehicles would convey a division of 10,000 sabres and bayonets, while in India 1,743 vehicles would be necessary for the same force; the difference of 307 vehicles represents more than 7 trains, a very considerable addition for so small a number of troops. These figures prove the urgent necessity of reducing the impedimenta of an army to the lowest possible scale consistent with efficiency, and shows the enormous number of vehicles that are necessary for the transport of armed men, even under the most favourable conditions.

The actual number of vehicles of all sorts in India, which could be made available for the transport of troops, will be found in the return of Rolling-stock, Appendix A, but in calculating the number available for use, a certain deduction must be made for those carriages which are under repair or unserviceable. Colonel Wolseley says that this should be taken at 50 per cent. of engines and 30 per cent of carriages, but the railway companies in India consider this an unnecessarily large estimate. The Traffic Manager of the G. I. P. Railway states that 5 per cent of the vehicles would be unserviceable and unavailable in any emergency, and that an additional 10 per cent will represent those

* The following information on this point is taken from a Return of Rolling-stock, dated 31st December 1871, compiled in the Quartermaster General's Office :—A powder van of five tons will carry 224 barrels (50lbs. each) of powder, or 450 boxes of small-arm ammunition, and a van of eight tons will carry 920 boxes. In boxes the full weight-carrying capacity of the powder van can be taken; in barrels about 1-5th less.

† It is advisable to use separate trains for the conveyance of troops and gunpowder. During the Austrian concentration of 1863 an accident occurred to a train on the Verona line, when nearly 150 Austrian soldiers were killed and wounded by the explosion of some ammunition wagons.

which only require ordinary repairs, such as painting and the like, and which could be used if really necessary. Regarding engines I have no information, as, strange to say, they are not included in the returns of rolling-stock sent to the Quartermaster General's Office.

II.—COMPOSITION OF TRAINS.

On this subject there are no instructions in our regulations, nor is it a matter on which there is much to be said; it should, however, be borne in mind that while men do not require a platform to embark or disembark, guns and horses do. Horse and carriage trucks should, therefore be placed together, so that if the platform be too short, only that part of the trains in which they are need be brought up to it.

III.—EMBARKING AND DISEMBARKING.

The Railway Regulations give no information regarding the time required for embarking the different arms of the service, and a staff officer is therefore without any official guide on this most important fact in arranging for the despatch of large numbers of troops. It is obvious that unless the time necessary for this operation be very accurately judged, no scheme for the movement of anything larger than a single regiment can be satisfactorily prepared. The time required may be said to depend upon three conditions :—

- a.—Nature of rolling-stock
- b.—The platform accommodation.
- c.—Acquaintance of the officers and men with the operation.

Even with the best trained troops a certain amount of delay is inevitable if the rolling-stock be extemporised for the occasion, that is, if there are covered vans in place of horse boxes for the horses, and hastily fitted up trucks instead of ordinary carriages for the men. In such cases a margin of one-third or one-fourth of the time usually considered necessary should be allowed.

The extent of platform accommodation governs rather the number of men you can send off in a given time than the time required in embarking them, but this element must be taken into consideration when only inconvenient or temporary platforms are available for the horses and guns, and when the men have to embark on the roadside without any platforms at all.

It does not require any arguments to prove that the time taken to embark by a regiment, battery, or squadron very much depends on the practice which the officers, men, and horses have already had in the operation. It is evident that if you have got to pack the impedimenta of a battalion into a certain number of wagons, and then distribute 1,000 men into 125 separate little compartments, the operation will be much quicker performed if the officers and men are familiar with the work

than if they are entirely unpractised. This consideration, of course, affects cavalry and artillery to a greater extent than infantry, insomuch, as horses and wagons are less manageable than men. In these days when armies, even in India, would be to a great extent concentrated by means of railways, and when the fate of the empire might hang on the rapidity and regularity with which the troops could be brought up, it is clear that this matter of embarkation does not as yet receive the consideration its importance deserves. I have never heard of any General or Colonel in this country who ever practised his men at getting into and out of railway carriages, which, when large numbers are concerned, is by no means so simple an operation as is generally imagined. We possess special facilities for this sort of instruction in India, for, except in the Punjab proper, most large cantonments are situated on lines of railway with small traffic, where a word from the Government would place any required number of railway vehicles at the disposal of the military authorities. One or two trains of 40 or 50 vehicles each, and the use of the movable column carriage to bring the baggage, &c., down to the station, are all the assistance required. It is not necessary to move the trains off—that can be imagined; all that is required is to practise the men and officers in packing and unpacking their baggage, wagons, guns, &c., and *the horses* and themselves in getting into and out of carriages, with the greatest practicable celerity and order. If this little operation could be repeated, say, a dozen times during the cold season by all the troops at the stations on the line of railway, absolutely no expense would be caused to the public, while those officers, who might hereafter be charged with the task of collecting 10,000 men at Rawul Pindee within a week, would have reliable data on which to work, and would feel some degree of confidence that their arrangements would not fall through, owing to the actual time of despatch being double what was calculated on as sufficient. No illustrations are necessary to show that the success of any large concentration of troops by railway *entirely* depends upon the regularity with which the trains can be filled at one end and emptied at the other; and it is quite evident that no staff officer, not even Von Moltke himself, could draw up a reliable concentration scheme unless he knew *for certain* what time the troops would take in embarking and disembarking. Now in India the troops are as yet without the practice which alone can ensure punctuality, and the staff can only guess at the data which form the very basis of their calculations. In England some small experiments in these matters were carried out at Willesden, a few years ago, with the following results:—

Artillery.—Each train loaded in half an hour. At a small platform one sub-division unloaded in 7 minutes.

Cavalry.—Four squadrons were experimented on—one squadron with unsaddled horses and low-door trucks, the others with saddled horses and high door trucks; the unsaddled squadron took one hour to pack saddles and embark themselves and horses, and 42 minutes to unload, saddle, and move off.

The three saddled squadrons took 27, 29, and 21 minutes respectively to load, and 23, 21, and 20 minutes to unload and move off.

For journeys of moderate length it is considered that horses travel best saddled. The Austrians say that if the animals are to be kept in boxes or trucks longer than 12 hours, they should be unsaddled. This point, however, must depend a good deal upon climate, and it is one that should be settled by the experience of cavalry officers. No experiments were made with infantry, but the committee estimated that a battalion could be loaded in ten minutes and unloaded in five.

These results are not, however, of much practical value as the troops experimented with were unprovided with any field equipment.

Major Colley thinks that it would not be safe to estimate for less than 20 minutes being required for infantry, and 40 minutes for cavalry and artillery; and Colonel Hamley states that a regiment of cavalry can be loaded in about 25 minutes, a battery of artillery in 30 minutes, and that infantry, standing ready at the station, and properly practised, can embark in a very few minutes.

In Prussia the following times for loading and unloading are allowed by the staff when framing concentration schemes :—Infantry, 15 to 20 minutes loading, 15 minutes unloading; Cavalry, 30 to 60 minutes loading, 15 to 90 minutes unloading; Artillery twice as long as cavalry; Commissariat train 4 to 8 hours, either loading or unloading.

Colonel Wolseley estimates that it would take 30 minutes to place half a battalion of infantry with its field equipment, regimental transport, &c., in a train, and double that time to load each train carrying cavalry, artillery, or stores.

It is very important that we should know exactly what time these operations would require in India, for though it is improbable that our railway resources will admit of the despatch of trains at less intervals than two hours, yet on an emergency it might be necessary to forward troops quicker even at the risk of accident.

The intervals between trains depend, on a double line, mainly upon the amount of rolling-stock that is at command. If the number of vehicles collected at the starting point can convey the whole force, if the trains can be loaded with sufficient rapidity, and if the telegraph and signal arrangements are adequate, English railway managers consider intervals of 5 minutes sufficient, but that 7 or 8 minutes would be safer. In Prussia, where the traffic is very much less than on the English lines, a minimum interval of 30 minutes is thought to be necessary; but in India, even with double lines, at least one hour's interval would probably be unavoidable. On single lines the intervals between trains depend (1) on the distances between stations, (2) whether it is necessary to run return trains of empties. If there is sufficient rolling-stock at the starting point for the whole force, the minimum interval between trains must be the time required to travel between the two stations which are

furthest apart ; and if the carriages have to be returned from the arrival stations, the intervals must be double that time. The number of men despatched on a single line can, however, be practically doubled or trebled without much risk of accident by running trains in groups of two or three, that is, of course, supposing the rolling stock to be sufficient.

The number of trains, however, that can be despatched within the 24 hours is governed, not only by the number of carriages and engines available, but by the ability of the railway officials to endure the pressure put upon them. In India where the ordinary traffic is small, the working staff is kept proportionately reduced, and is, moreover composed, to a considerable extent, of Asiatics unaccustomed to the management of large numbers of trains. Unless, therefore, the executive staff of an Indian railway can be largely increased on occasion, it would manifestly be impossible to transport troops with anything like the rapidity attained in Europe. The ordinary establishments might perhaps stand the strain of 12 or 14 trains per diem for 24 or even 48 hours, but no prolonged movement extending over several days would be possible unless assistance is available either from foreign lines or from some other source ; so that, in fact, the real measure of the troop-carrying power of a railway is not the amount of the rolling-stock, nor the length of the platforms, but the physical ability of the railroad officials to work a given number of trains per diem.

The rate of travelling, including minor halts, is in Prussia from 15 to 18 miles an hour ; in England the Traffic Managers say they would run up to 20 to 25 miles an hour, but in India it would not be safe to calculate on a greater speed than 15 or 16 miles an hour.

IV.—PLATFORMS.

As has been before stated, the regularity and expedition possible in the despatch of large numbers of troops depend very much upon the extent of platform available. Infantry can enter a train or even load their baggage anywhere, but neither horses, guns, nor wagons can possibly be placed in the vehicles without platforms of some sort. The importance of this consideration is self evident, and is well shown in the following extract from a paper of hints for reports on railways, which has lately been issued from the Quartermaster General's Office, and which is reprinted at the end of this paper, Appendix B:—

Platforms: their length, breadth, and height ; number of vehicles which could be unloaded simultaneously, allowing 30 feet to each.

Where could temporary platforms be most advantageously erected on emergency, consideration being had to convenience of access from a road ? These proposed sites should be shown on the plan.

What local means are there for constructing temporary platforms, with reference to timber, earth, labour, time ; the platforms to be suitable for the embarkation of guns and cavalry ?

Notes. (a)—On the London and North-Western Railway a platform of sleepers, 18 feet long, 25 feet wide, with a slope to the rear of 1 in 9, was constructed by 15 men in $1\frac{1}{2}$ hours.

(b)—A timber frame-work platform, filled with gravel and board, measuring 124×25 feet, required 112 men and two ballast trains to bring up gravel; the materials were brought from a distance of 45 miles and the platform was completed in eight hours.

(c)—Sometimes a cutting may be conveniently altered into a platform.

(d)—Temporary platforms should be arranged in lengths sufficient to accommodate a train, and with intervals between them to allow empty trains to pass on to the unoccupied line. The above is, of course, only applicable to double lines, or to stations where there are plenty of sidings.

Supposing all the permanent and temporary platforms to be occupied with baggage vans or artillery trains, where could infantry be most conveniently disembarked? The places should be shown on the plan.

It would be a very useful exercise, both for the troops and for staff officers, occasionally to construct temporary platforms with what materials might be available in the executive engineer's yard, or at the railway station. Colonel Hamley states that a platform 300 feet long can be made in three hours by 200 men, out of the materials which can always be easily collected at a station. No expense would be necessary, as the timber need not be cut, and the labour would be done by working parties from a regiment.

At no railway station in India probably, except at the large termini, is there sufficient length of platform for embarking simultaneously a regiment of cavalry and a battery of artillery, and it would be highly advantageous were officers and men thus practised a little in putting up temporary platforms.

Cavalry and artillery should also be accustomed to get out of a train on the roadside, using only such skids, planks, &c., as could be carried with them in the train. In France one or two movable platforms, about 16 feet long, and a little wider than the door of a wagon, are ordered to be carried with each cavalry or artillery train.* In Prussia the horse trucks are all made with the ends to let down, so that a continuous platform can be formed, and an entire train can be unloaded anywhere in a very short time.

Colonel Wolseley relates that during the Fenian raids upon Canada, every train was provided with skids, and that he saw a battery of artillery disembarked by their assistance in a very short time when far from any station.

* See also Para. 90, page 18 of the Indian Transport Regulations, Part II.

V.—THE REQUIREMENTS OF A RAILWAY STATION, AND THE DUTIES OF THE OFFICER IN CHARGE.

The various points which require attention in considering military necessities at a Railway station are fully detailed in Section G. of the Quartermaster General's Circular, which is reprinted as Appendix B, and there is nothing more to be said on the subject.

Of the duties of the military officer in charge of the station, by far the most important is the strictest enforcement of order and regularity : he should see that trains are loaded and unloaded with the utmost possible despatch ; that the station itself is kept clear of troops, who should be marched off immediately on arrival to their allotted camping grounds ; that adequate arrangements are made for the refreshment of troops halting en route ; that a sufficient number of buckets (fire buckets from barracks would do very well) are standing on the platform ready to water the horses as the train comes in ; that there is a sufficiency of fuel and water for the engines, and that no delay is permitted in starting the trains exactly at the moment fixed in the time-tables. This last consideration is most important, for any interference by local authorities with the general arrangements of trains may completely upset the most carefully organized scheme ; and for this reason the officer in charge of a station should be absolutely prohibited from starting an unauthorized train, or diverting any train from the purpose for which it was originally intended. Should any alteration become necessary, the case should be reported by telegraph for the orders of superior authority.

The want of order, discipline, and regularity must, in all great railway movements, result in disaster, even though the amplest means of transport are available and the stations replete with every convenience. As an illustration of this fact, it may be mentioned that although the French in July 1870 had 7,000 yards of rail and sidings at Metz, of which 2,400 yards were available for unloading, yet that the station was completely blocked in a few days. It is manifest that punctuality in the unloading and return of trains is of especial importance at the stations of arrival, for any delay there will throw the whole movement out of gear, and result in a general block along lines of railway perhaps hundreds of miles in length.

Station Commandants must be vigilant to prevent railway trucks and vans being converted into storehouses for supplies by Commissariat officers. All vehicles should be unloaded and returned immediately on arrival. Jaquemin, in his work on railways, dwells strongly on the tendency of administrative officers to make railroad stations depots for their stores, and points out the inconvenience of thus diminishing the amount of rolling-stock and accommodation for disembarking troops and supplies. Local resources for storing the contents of commissariat and ordnance trains should be ascertained beforehand, and, if necessary, supplemented by temporary expedients.

Notes. (a)—On the London and North-Western Railway a platform of sleepers, 18 feet long, 25 feet wide, with a slope to the rear of 1 in 9, was constructed by 15 men in $1\frac{1}{2}$ hours.

(b)—A timber frame-work platform, filled with gravel and board, measuring 124×25 feet, required 112 men and two ballast trains to bring up gravel; the materials were brought from a distance of 45 miles and the platform was completed in eight hours.

(c)—Sometimes a cutting may be conveniently altered into a platform.

(d)—Temporary platforms should be arranged in lengths sufficient to accommodate a train, and with intervals between them to allow empty trains to pass on to the unoccupied line. The above is, of course, only applicable to double lines, or to stations where there are plenty of sidings.

Supposing all the permanent and temporary platforms to be occupied with baggage vans or artillery trains, where could infantry be most conveniently disembarked? The places should be shown on the plan.

It would be a very useful exercise, both for the troops and for staff officers, occasionally to construct temporary platforms with what materials might be available in the executive engineer's yard, or at the railway station. Colonel Hamley states that a platform 300 feet long can be made in three hours by 200 men, out of the materials which can always be easily collected at a station. No expense would be necessary, as the timber need not be cut, and the labour would be done by working parties from a regiment.

At no railway station in India probably, except at the large termini, is there sufficient length of platform for embarking simultaneously a regiment of cavalry and a battery of artillery, and it would be highly advantageous were officers and men thus practised a little in putting up temporary platforms.

Cavalry and artillery should also be accustomed to get out of a train on the roadside, using only such skids, planks, &c., as could be carried with them in the train. In France one or two movable platforms, about 16 feet long, and a little wider than the door of a wagon, are ordered to be carried with each cavalry or artillery train.* In Prussia the horse trucks are all made with the ends to let down, so that a continuous platform can be formed, and an entire train can be unloaded anywhere in a very short time.

Colonel Wolseley relates that during the Fenian raids upon Canada, every train was provided with skids, and that he saw a battery of artillery disembarked by their assistance in a very short time when far from any station.

* See also Para. 90, page 18 of the Indian Transport Regulations, Part II.

V.—THE REQUIREMENTS OF A [RAILWAY STATION, AND THE DUTIES OF THE OFFICER IN CHARGE.

The various points which require attention in considering military necessities at a Railway station are fully detailed in Section G. of the Quartermaster General's Circular, which is reprinted as Appendix B, and there is nothing more to be said on the subject.

Of the duties of the military officer in charge of the station, by far the most important is the strictest enforcement of order and regularity : he should see that trains are loaded and unloaded with the utmost possible despatch ; that the station itself is kept clear of troops, who should be marched off immediately on arrival to their allotted camping grounds ; that adequate arrangements are made for the refreshment of troops halting en route ; that a sufficient number of buckets (fire buckets from barracks would do very well) are standing on the platform ready to water the horses as the train comes in ; that there is a sufficiency of fuel and water for the engines, and that no delay is permitted in starting the trains exactly at the moment fixed in the time-tables. This last consideration is most important, for any interference by local authorities with the general arrangements of trains may completely upset the most carefully organized scheme ; and for this reason the officer in charge of a station should be absolutely prohibited from starting an unauthorized train, or diverting any train from the purpose for which it was originally intended. Should any alteration become necessary, the case should be reported by telegraph for the orders of superior authority.

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Major Wilson tells us that in Austria the commandants of *etappen* station are selected during peace from retired officers of the army, and provisionally commissioned. They are allowed to reside in any part of the empire ; but on war being declared their commissions become active, and they are bound to proceed at once to the stations, to which they have been appointed. An officer before receiving a provisional commission is subjected to a very practical examination : if he has applied for this employment, an order comes from the War Office to him—" You are appointed *etappen* commandant at A * * *, proceed there at once by rail, and send in a report in three days' time of the arrangements you consider necessary. " The report includes the capabilities of the station for stores, barracks, hospitals, latrines, feeding troops, &c. ; plans of temporary buildings which would have to be erected, or of neighbouring houses which would have to be hired ; names of persons willing to contract for the supply of food, or whether the supplies would have to be brought from a distance. The report, in short, deals with everything necessary for the formation of a thoroughly efficient *etappen* station in time of war.

It is evident that we have here a new sphere of usefulness for the general duty officers that now burden our finances, and vex the souls of our military reformers, and one that many of them are eminently fitted for.

VI.—RAILWAY CORPS.

In Europe military railway corps are organised in peace time for the purpose of working lines in foreign territories occupied during war ; but in India, where our neighbours are less advanced in the march of civilization, this want would not be felt, though the services of such a corps would be indispensable to supplement existing railway establishments, which are but just equal to the dispatch of three or four trains daily, and would probably break down under any great pressure.

In Prussia before the last war there were four " field railway detachments," at the head of each of which was a superior civilian railway official, termed the " technical chief. " Each detachment was divided into three sections ; the first, the " technical railway *personnel*," consisted of station-masters, locomotive engineers, line constructors, store-keepers, &c., and was charged with the formation of trains and general local railway traffic duties. The second was a military railway company of 175 sappers and artificers, commanded by military officers, and charged with the repair of the line and the minor executive details of railway work. The third was a staff of civil overseers and labourers, who were only taken into Government employ as occasion required. During war the " field detachment " was under the orders of the general officer charged with the lines of communication (*Etappen Inspektor*), the civil " technical chief " being his adviser in railway matters. This organization does not seem, however, to have satisfied the Prussians, for they are now engaged in placing the railway

service on a more permanent footing, and intend to give it a purely military character, by making it a special branch of the engineer corps.

In England as in India we are entirely without any organization of the kind.

Sir Garnet Wolseley proposes a very practical scheme for adoption at home, but which, being framed with the view of utilising the home railway staff for service on foreign railways, does not meet our wants in this country. Here we need a plan, not for exporting our railway officials, but for reinforcing them on necessity to an extent sufficient to enable the fullest use to be made of our railway system for the purposes of war. We want, in short, a reserve of officers and men, European and native, competent to undertake the duties of station masters, telegraph operators, signalmen, pointsmen, guards, engine-drivers, stokers, and platelayers. How such a corps can best be formed with the least subtraction from the fighting strength of our army, how it can be maintained efficiently for the purpose for which it would be required, how many men it should consist of, whether it should be a separate corps, or a specially instructed branch of the sappers and miners—are all questions requiring serious consideration, and which I confess myself quite unable to solve. There can, I think, be no doubt that the present establishments of the Indian railways, whether State or private, are utterly inadequate for the requirements of such a traffic as would be necessary were it desired to concentrate, and afterwards supply, 50,000 troops on the North-Western Frontier; and if this be true, ordinary prudence seems to dictate that the subject should be considered beforehand. To do this properly it would be necessary to obtain the opinion of competent men as to the staff required to run a given number of trains per diem; to ascertain the strength of the existing establishments on the main lines, and to what extent they could be supplemented from local or branch lines, which would not be required for the transport of troops or stores. These data are at present wanting, and no opinion worth anything can therefore be given on the matter. But the subject is one that appears to require attention, and that might very easily be put into shape by a committee of an experienced Traffic Manager and one or two military officers acquainted with railway matters.

VII.—CONSTRUCTION, REPAIR, DEFENCE, AND RECONNAISSANCE OF RAILWAYS.

All staff officers should be required to possess sufficient practical knowledge of the construction and working of railways, to enable them to ascertain whether the several parts of the permanent way and rolling-stock are in good and serviceable order, and what work the establishments could fairly be expected to perform, so that an officer should be able to supply a reliable report on the military capabilities of any particular line. At present this branch of staff education is entirely neglected in India, and there is hardly an officer in the country possessed of the requisite technical knowledge; officers of the Quartermaster General's

Department at least should undergo a short course of practical instruction in these matters at one of our great railway centres.

The protection of railways during times of popular insurrection is a very difficult question, but one which might any day require solution in India. The climate and the great length of the lines would render any attempts at regular patrolling impossible, and the most effectual means would probably be to hold the inhabitants of villages adjacent to the line strictly responsible for any damage it might receive. The Prussians when in France established a guard at each railway station, with small detachments posted as picquets in the neighbouring villages and towns, who constantly patrolled the line. There were but few accidents to trains during the occupation, and this, the *Edinburgh Review* informs us, was mainly attributed by the Germans to their practice of carrying on the engine of each train some notable inhabitant of the district, so that he should be the first to suffer from an accident.

The most vulnerable points in a railway are the bridges, tunnels, deep cuttings, and high embankments; of the three last we have not many examples, at least in Upper India, but it would probably be found necessary to post detachments for the protection of the most important bridges during a time of disturbance.

Major deBourbel, of the Royal Engineers, proposes that as the country in India is for the most part flat, high towers should be built at the stations and at the main bridges, capable of holding a small guard, from which watchmen could see by day a distance of at least six miles; the towers to be fitted with signalling apparatus, and a small force to be kept at the principal stations ready to sally out on the alarm being given. Major de Bourbel is of opinion, that though the risk of obstruction or interruption to railways in India would be great, yet the amount of injury that could be done to the permanent-way by the people with their inferior tools could not be very considerable. He recommends that a quantity of surplus material, in the shape of iron girders and timber beams, rails, sleepers, etc., should be kept in store at the chief stations ready to repair any damage. It may be mentioned, as a curious illustration of German forethought, that in Prussia all the railway bridges are constructed on standard designs of different spans, and that at Coblenz spare bridges of the several sizes are stored; so that, if it were wished to repair or re-establish any particular bridge that had been destroyed by the enemy, it would only be necessary to telegraph to Coblenz for a bridge of a particular span, when all the component parts would be sent up complete by the next train.

The principal railway stations in India would, in times of disturbance, become strategical points of the first importance; and, as unfortunately but very few have been built, with a special view to capability of defence the timely consideration of the best means of defending them calls for careful study.

The importance of this matter is hinted at in the concluding paragraph of the Quartermaster General's circular previously quoted, and there can be no doubt that it should not be overlooked. Projects for the defence of the great railway centres, such as Lahore, Allahabad, Jumnalpoore, &c., should be drawn up; the number of men and guns that would be necessary and that could be spared from the nearest military garrisons, should be calculated; the trace and disposition of the earthworks should be fixed, and it might be desirable, in some cases, to employ troops in throwing up particular portions of the works. No public alarm need be caused by this, as the ostensible purpose would be instruction for the army. The presence of ready means of defence might some day prove very valuable; and it would certainly be extremely useful to the local authorities to have the question of defence to some extent already worked out. Modifications of the original scheme would, of course, be dictated by circumstances, but the main features would probably be preserved. In any case nothing but good can result from the attention of the local military authorities being directed to those subjects.

The construction, repair, and demolition, if necessary, of railways during war would in India be probably most conveniently performed by the civilian staff and we have no need of any special military corps for these purposes.

The points requiring attention in a military *reconnaissance* or report have been so fully detailed by the Quartermaster General in the annexed circular, that the subject may be regarded as exhausted.

I have now written all that I have got to say on the subject, and can only hope this paper may draw attention to the fact that, though the vast railway system now approaching completion in India multiplies to an unknown extent our military strength, yet that is only by careful forethought and preparation we can expect to obtain full advantage from it in the hour of need. Our Official Railway Regulations, though full of lucid instructions as to who is, and who is not, entitled to a railway ticket at the public expense, are entirely silent regarding what may be termed the war uses of railways, and the fact furnishes a convincing proof, if one were needed, that this aspect of the question has not yet received adequate attention.

In conclusion, I desire to acknowledge that whatever is valuable in the foregoing paper has been obtained from one of the subjoined sources, and that I am under special obligations to the "Notes of Lectures" by Major Pomeroy Colley:—

1. The use of Railroads in War. A Lecture by Colonel Sir Garnet Wolseley, C. B., K. M. G., London, 1873.
2. The Use of Railroads in time of War. By Major General Sir David Wood, K. C. B., No. 1, Vol. VIII, of the Proceedings of the Royal Artillery Institution, 1872.

Organization for the Transport of large bodies of Troops on Rail-

ways. Translated from the Prussian Regulations for Military Transport on Railways, 1867, by Captain J. T. Barrington, Royal Artillery No. 8, Vol. VI., Proceedings of the Royal Artillery Institution, 1869.

4. Notes of Lectures on Military Administration, delivered by Professor Major Pomeroy Colley at the Staff College, privately printed, and kindly lent to me by Lieutenant Collen, Royal Artillery, Assistant Secretary in the Military Department of the Government of India.

5. Lecture on the Military Value of Railways. By Major deBourbel, Royal Engineers, delivered at the Military Institution at Lucknow, 1872.

6. Manuscript Notes on the Military use of Railways. By Captain Chapman, Deputy Assistant Quartermaster-General.

7. Railway Organization in the late War, *Edinburgh Review*, January 1872.

8. A Report (MS.) by Major Wilson, R. E., of the Topographical Department, War Office, on the General Staff of the Austrian Army.

9. Reports by Dr. Wyatt and others, on the medical arrangements of the German and French Armies in 1870.

SIMLA, }
20th September 1873.

APPENDIX A.
Return of the Rolling Stock on the Indian Railways on the 31st December 1872, compiled from the Official Returns received in the Office of the Quartermaster General.

VEHICLES.	RAILWAYS.											
	Sind Railway.	Bombay, Baroda and Central India Railway.	Great Indian Peninsula Railway.	Oudh and Rohilkund Railway. —(Rohilkund Division.	Oudh and Rohilkund Railway. —(Gudh Section.)	Madras Railway.	Great Southern of Indian Railway.	Eastern Bengal Railway.	East Indian Railway.	Sind, Punjab and Delhi Railway.	Calcutta & South Eastern (Port Canning Railway).	Carnatic Railway.
First Class Carriages	5	8	80	1	6	19	...	7	76	18	...	...
Saloon Carriages	1	8	3	...	...	...	...	2	13	...	...	...
Composite Carriages	6	8	76	1	7	32	...	11	21	34	...	...
Second and "Upper" Class Carriages	21	21	152	6	7	55	2	9	100	39	...	...
Third, Fourth, "Intermediate," and Cooly Class Carriages	11	130	454	25	99	236	34	93	419	235	...	...
Invalid Carriages	...	...	6	...	...	...	...	...	3	1	...	...
Open Wagons and Trucks*	400	1,725	3,402	45	189	2,771	180	244	2,773	465	...	...
Covered Wagons and Vans†	265	1,083	3,082	49	160	53	150	315	3,945	1,341	...	...
Brake Vans	...	61	377	...	...	60	12	8	271	68	...	...
Powder Vans	6	6	17	...	4	3	...	...	31	11	...	...
Horse Boxes, 3 Horses	10	8	93	1	10	40	3	6	42	26	...	...
Ditto 6 do.	...	7	...	...	...	...	...	...	33	2	...	...
Total	725	3,065	7,742	128	482	3,269	388	695	7,727	2,240	...	...
												26,461
												Not returned.
												Not returned.
										</		

* Includes high-sided and low-sided wagons, ballast, timber, cattle, sheep, carriage, flat cotton, rail, trucks, &c., &c.

† Includes covered cotton wagons, prison vans, &c.

Post Office Vans are not included in this Return, as they would never be available for military purposes.

QUARTERMASTER GENERAL'S OFFICE, ARMY HEAD QUARTERS, {

Simla, 1st September 1873.

(Signed) H. COLLETT, Captain,

Dy. Assistant Quartermaster General.

APPENDIX B.

CIRCULAR MEMORANDUM

Addressed to General Officers Commanding Divisions and Districts.

QUARTERMASTER GENERAL'S OFFICE,

Army Head Quarters, Simla, 1st July 1873.

THE Right Honorable the Commander-in-Chief being desirous that detailed information regarding the military value and capabilities of the railways in the Bengal Presidency should be collected in this office and at the headquarters of divisions and districts, the Quartermaster General is instructed to issue the following orders on the subject.

2 The officers of the Quartermaster General's staff attached to divisions and districts will prepare, in duplicate, a careful report of the railways which pass through their Commands, one copy being forwarded to this office for submission to His Excellency the Commander-in-Chief, and the other retained for record and for the information of the general officer commanding.

3. For the purposes of report the lines of railway will be divided into sections, which are distributed to divisions and districts as follows :—

Presidency District.—East Indian Railway, from Calcutta up to and including Luckeeserai, with Chord Line and branches ; also the Eastern Bengal Railway, from Calcutta to the terminus.

Allahabad Divison.—East Indian Railway, from Luckeeserai up to and including Cawnpore.

Oudh Division.—Oudh and Rohilkund Railway, from Lucknow to Cawnpore.

From Lucknow to Benares.

From Lucknow *up to*, but *not including*, Shahjehanpore.

Saugor District.—Great Indian Peninsula and East Indian Railways, from the Nerbudda Bridge up to, but not including, Allahabad.

Rohilkund District.—Oudh and Rohilkund Railway, from and including Shahjehanpore to its junction with the East Indian Railway at Allyghur, but not including that station.

Meerut Divison.—East Indian and Sind, Punjab, and Delhi Railways, from, but not including, Cawnpore, up to and including Saharunpore, also the Branch Lines to Agra and Delhi.

Sirhind Division.—Sind, Punjab, and Delhi Railway, from, but

not including Saharunpore, up to and including the station on the right bank of the Beas.

Lahore Division.—Sind, Punjab, and Delhi Railways, from, but not including, the Beas Station up to Mooltan.

4. Those parts of the report which refer to stations at which troops are quartered, but which are not the head quarters of a division or district, as, for example, Jullunder, in the Sirhind division, should be extracted and deposited in the Staff Office of the station.

5. The accompanying list of subjects on which information is required is enclosed for guidance. It is not intended to confine an officer to the points therein enumerated, as the more full and detailed a report is the better, provided that it is correct in every particular, and as much as possible, condensed.

6. As it is the object of the Commander-in-Chief in requiring these reports to obtain authentic military records which may serve for future reference, it is of the highest importance that the information they contain should be of exact accuracy, and the greatest care in their preparation is therefore enjoined.

7. The Government of India has issued instructions to the several Railway Companies to give all necessary information and assistance to the officers engaged in this duty, who are directed, before commencing work, to place themselves in communication with the principal officials of the lines on which they are to report, as it is only through their co-operation that the collection of the required details is possible.

8. The report should be accompanied by a map of the division or district, on a scale of about four miles to an inch, on which the lines of railway, the different stations, and the most important roads may be conveniently shown.

9. Plans of the principal stations, indicating the various points referred to in the report, are also to be furnished.

10. Hereafter, on the 1st January of each year, a supplementary report is to be forwarded to this office, adding whatever is necessary to render the information under each head complete and up to date.

11. General officers are permitted to temporarily attach one or two selected regimental officers as assistants to the officers of the Quartermaster General's staff while engaged in preparing these reports.

12. The officers employed on this duty may be provided, under the orders of the general officers commanding, with warrants to travel at the public expense by railway within the limits of the section on which they are working.

13. The reports are to be forwarded to the Quartermaster General's Office at Simla by 1st January 1874.

By order,

FRED. ROBERTS, *Lieut. Colonel,*

Offg. Quartermaster General.

ANNEXURE.

A.—The Line of Railway: General Description.

1. Its general direction—from where to where ?
2. Is it a State line, or a Guaranteed Railway ?
3. With what other lines is it connected ; at what points ?
4. Are the other lines of the same, or a different gauge ?
5. With what arsenals, magazines or sea ports is the line connected, and at what distances are they from the divisional or district head quarters ?

B.—The Line within the limits of the Section appointed for report.

1. Is it double or single ?
2. Gauge in feet and inches.
3. Nature of the country through which the line passes.
4. Distances from station to station.
5. Is this line generally level ?
6. What inclines are there ; where situated ; their length and maximum gradient ?
7. Is its course generally straight ?
8. What is the minimum radius of the curves ?
9. Supposing the railway to be temporarily disabled, what parallel roads are there available for the march of troops ; what are the distances by these roads, and their distance from the line ; are they metalled ?

NOTE.—(These roads should be shewn on the map.)

10. Rails : what description of ; their condition, length how laid ?
11. Sleepers : what description of, their condition, how laid, longitudinally or transversely ?
12. Viaducts : nature of construction, length, material, situation ?
13. Cuttings : their length, situation, maximum depth ?*
14. Embankments : their length, situation, maximum height ?*
15. Bridges : number of ; situation, material, nature of construction, length ?
16. In the case of bridges of considerable size, it should be added how troops could be best passed over if the bridge were swept away or blown up ; and whether materials exist for the temporary repairs of the bridges by local means.
17. Tunnels : their number, situation, length, condition ?

* When of trifling importance, not exceeding three or four feet in depth or height, these may be neglected.

18. Arrangements for signalling (*not* telegraphic) : are they sufficient, and in good working order?

C.—The Telegraph.

1. Poles : how many sets of ; their material, condition ?
2. Wires : number of ; are they Government or private ?
3. Batteries : where kept ?

D.—The Engines.

Places where they can be—

- (a.)—Repaired.
- (b.)—Watered.
- (c.)—Fuelled.

E.—Watering Stations.

- (a.)—Names of Stations.
- (b.)—Description of pumps or well used.
- (c.)—Size and capacity of tanks.
- (d.)—Time required to fill the tanks after exhaustion.

F.—Fuel.

- (a.)—Description of, used.
- (b.)—Where does it come from ?
- (c.)—At what places collected ?

G.—The Stations.

(*N. B.*—Most of the following points for report are applicable only to the principal, not the roadside stations.)

1. Of what material built ?
2. If there is not a regular watering-place, can arrangements be made to water engines on emergency, and how long would it take ? An engine requires about 700 gallons of water per hour.
3. Can an engine be repaired at the Station ?
4. Is it fuel station ; if not can fuel be supplied on emergency and to what extent ?
5. Telegraph Office : how many instruments ? What description ? Are there any batteries ? How many signallers ? Are they European or Native ?
6. Sidings : length ; situation to be shown on plan ?
7. The cross over lines or points from one line to another. Their number, condition, and situation to be shown on plan ?

8. Platforms : their length, breadth, and height ; number of vehicles which could be unloaded simultaneously, allowing 30 feet to each.

9. Where could temporary platforms be most advantageously erected on emergency, consideration being had to convenience of access from a road ? These proposed sites should be shown on the plan.

10. What local means are there for constructing temporary platforms, with reference to timber, earth, labour, time ; the platforms to be suitable for the embarkation of guns and cavalry ?

NOTE.—(a)—On the London and North-Western Railway a platform of sleepers 18 feet, long 25 feet wide, with a slope to the rear of 1 in 9, was constructed by 15 men in $1\frac{1}{2}$ hours.

(b)—A timber frame-work platform, filled with gravel and boarded, measuring $124' \times 25'$, required 112 men and two ballast trains to bring up gravel ; the materials were brought from a distance of 45 miles, and the platform was completed in eight hours.

(c).—Sometimes a cutting may be conveniently altered into a platform.

(d).—Temporary platforms should be arranged in lengths sufficient to accommodate a train, and with intervals between them to allow empty trains to pass on to the unoccupied lines, or to stations where there are plenty of sidings.

11. Supposing all the permanent and temporary platforms to be occupied with vans, or artillery trains, where could infantry be most conveniently disembarked ? The places should be shown on the plan.

12. If there is a station yard, its size and the width of its entrance gate should be stated.

13. What camping ground is available in the neighbourhood ; to what extent are supplies procurable for troops encamped ; is there plenty of water for them ; are there metalled roads from the station to the camps ?

NOTE.—The camps should, if possible, be connected with the station by different roads. If there is only one road, it is liable to get blocked.

14. Is there a crane or any mechanical lifting power at the station : what is its condition ? Its situation should be shown on the plan.

15. Is there a turn-table, its condition and situation ?

16. What fixed machinery is there at the station ?

17. Are there any workshops ; of what nature and extent ?

18. What sheds or godowns are there; what dimensions have the buildings; are they suitable for a depot of ordnance or commissariat stores; are the sheds connected with the main line by rails: are the approaches to them from the road metalled and in good order? The position of the buildings should be shown on the plan.

19. What convenience does the station possess for the temporary halt of troops *en route* with reference to—

a.—Commissariat establishments available?

b.—Means for watering horses?

20. What amount of rolling-stock is generally kept at the station, and which would be available on emergency?

21. What is the nearest station from which rolling-stock could be procured in large quantities?

22. In how many hours could the necessary number of vehicles for the conveyance of the movable column complete, but without transport, be collected at stations at which such a force is detailed?

23. Where are the most convenient places at which to dig latrines if large bodies of troops were passing through the station?

24. If the railway station be near an arsenal or magazine, it should be shown how the magazine is connected with the main line.

25. If the station be at a seaport, it should be shown what facilities there are for shipping troops, stores, &c., brought down by the rail; and whether branch lines connect the quays, wharfs, &c., with the main line,

NOTE.—In addition to the points enumerated above, information may be usefully added—

a.—Regarding the means to be adopted for the general defence of the line during an insurrection.

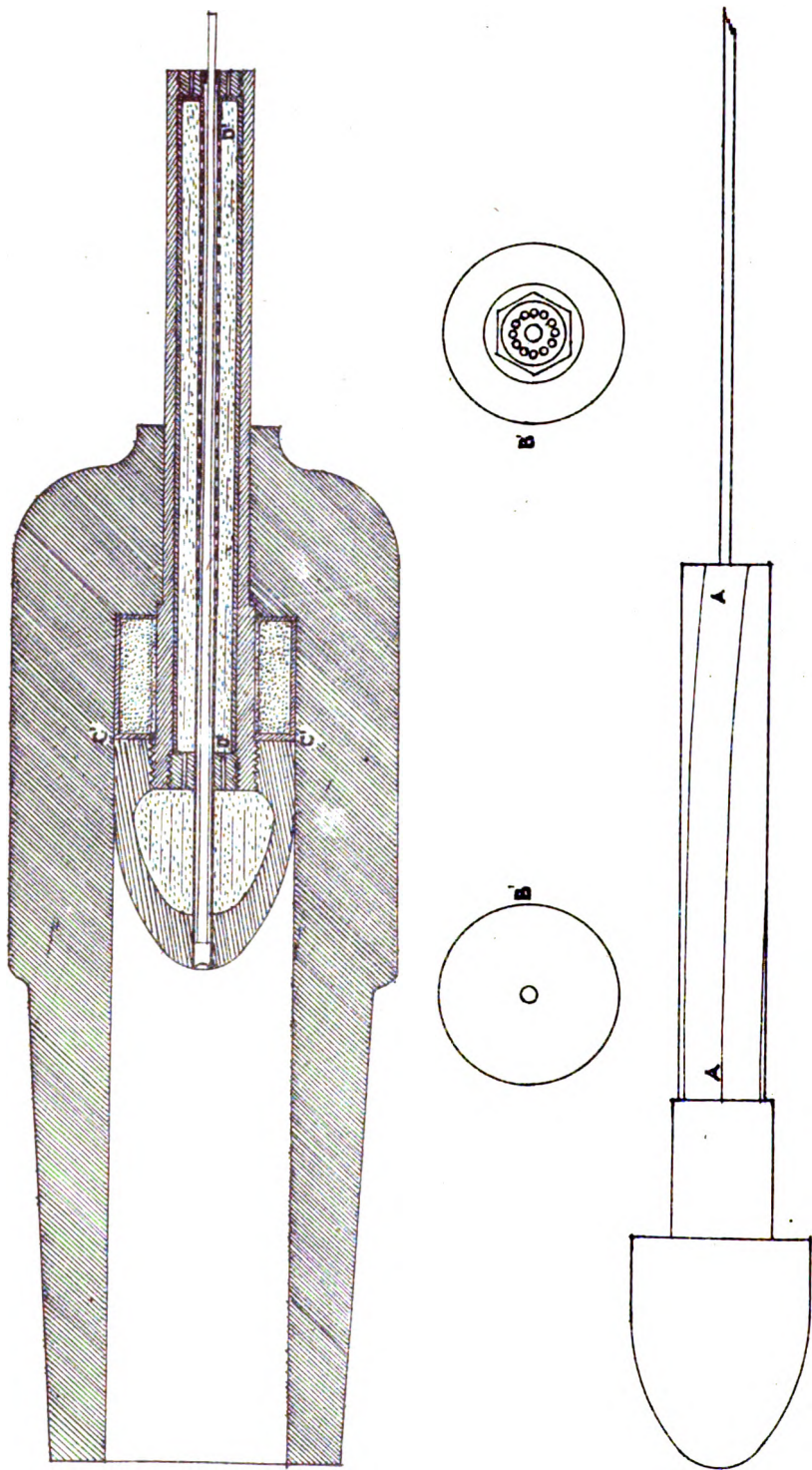
(b.)—Regarding the capabilities of defence possessed by the principal stations.

(c.)—Regarding the best means of defending the more important bridges.

Projects for the above may be drawn up under such suitable hypothetical conditions as may suggest themselves.

As such schemes require careful consideration, and are perhaps most valuable as professional studies, they need not be included in the report, but may be submitted subsequently as opportunity offers.

FRED ROBERTS, *Lieut. Colonel,*
Officiating Quartermaster General.



A A. Rocket shaft with Hexagonal rifling (being one complete turn in 6 feet). **B B'** End views of rocket.
c. c. Disc sheum in the sun. **d. d'** Papier mâché cylinder.

INVENTION.

ON ROCKET PROJECTILES.

OF all the implements of war that have ever been invented, either for the purpose of wounding or destroying human life, injuring an enemy's property by land or sea, or throwing their troops into disorder, none can compare with the War Rocket, as a combination of all these properties. This projectile is both light and compact, hence easy of transport, and uniting with the foregoing its own propelling power, renders it at all times a most formidable weapon. In addition to the above, it possesses attributes of a fear-inspiring character, which tests the steadiness of even disciplined soldiers, and which no cavalry however well trained, can long be made to stand against unshaken. Indeed were it not for their erratic flight, making them a source of danger alike to friend and foe, war rockets in all countries would rise to a position of the highest importance, as destructive agents. This unfortunate peculiarity has caused the attention of many inventors to be drawn to it, and attempts to rectify the same from time to time, have been both numerous and various. But with the single exception of Hale's improvements (of these projectiles) failure has hitherto attended all their efforts, and latterly even his rockets, ingenious as they undoubtedly are, have been condemned, as little or no dependence can be placed upon them. If under these circumstances we consent to be guided by the lessons that the experience of half a century has taught us, we can arrive at no other conclusion, than the following, viz. That war rockets, *per se*, are so uncertain and dangerous in their flight as almost to counter-balance by these defects, their remarkable qualities. There are other imperfections to which I desire to draw attention, and which apparently have not been noticed by inventors.

1st. The corrosion or rusting, through damp, of the iron cases into which the composition is rammed, which latter deteriorates in consequence.

2nd. The expansion and contraction of these iron cases from extremes of temperature cause the composition to separate or get detached from the sides that enclose it.

From each and both of the above causes, frequent "burstings" of these rockets, is a common occurrence. The means by which I would amend these defects are as simple as they are effective. I now proceed to give a brief sketch of my invention, together with a detailed account of some important modifications lately devised by me, which tend at the same time to make them lighter in weight and more effective in their flight.

" SPECIFICATION."

Improvement in Rocket Projectiles for purposes of War.

This invention has for its object the ensuring of an even, direct, and undeviating course in a rocket during its flight, and consists in imparting to the head of a rocket, an initial velocity, the flight being after-

wards sustained and prolonged by the re-active fire of the rocket. The projective force is applied approximately to the centre of gravity of the mass, and not as is usual (in projectiles) placed behind it.

To the inside of the rocket proper, or outer thin steel tube, is securely fixed or attached a papier mâché cylinder of sufficient thickness, tensile strength and tenacity, to contain the composition, to which is affixed by suitable means, a head containing a bursting charge, and being larger in diameter than the rocket. A smaller tube is centrally disposed for the entire length of the head and rocket, and firmly fixed to the head and vent-piece; where it passes through the composition, being studded with holes for the purpose of supplying air to the composition, thus superseding the ordinary method of ramming rockets. The composition in this case being rammed solid round the papier mâché cylinder. When the rocket is at rest this inner tube is occupied by a rod of somewhat less diameter than the interior diameter of the tube; one extremity of this rod forms the apex, of the rocket head, and is enlarged for a short distance of its length so as nearly to fit the Tube, the other extremity projects slightly beyond the Tube, and is fitted with a screw of two or more blades, for the purpose of assisting in causing the rocket to rotate during its flight; at the end of the tube and close to the vents of the rocket, a friction fuze is fitted accurately round the rod, being in connexion with the priming. On the rocket being projected from a suitable gun, the air impinging on the end of the rod which is hollowed, forces the rod down the entire length of the inner tube, the enlarged end of the rod tearing the fuze and thus igniting the composition, and then firmly jamming itself in the vent-piece. The tube being thus open to the atmosphere at the head and blocked at the vent-piece, an abundance of air is of necessity supplied to the burning composition.

The tubular cartridge by which the rocket is projected is disposed round the tube (which is here adequately strengthened for the purpose). The rocket is fired from a smooth bore gun, the internal diameter of which is equal to the diameter of the rocket head, and fitted with a piece of its breech to unscrew, the size to be slightly larger than the shaft of the rocket, to enable the thread of the screw to be fitted with a rifled box or bush to act upon the rifled shaft or tail of the rocket. But it is not absolutely necessary that the head of the rocket should fit the gun, as it can be fired from any smooth bore gun, provided the rocket be fitted with an annular disc of papier mâché, of the same diameter as the calibre of the gun, and placed in front of the charge to guide the head in passing from the gun. On discharge the disc will from its lightness fall to the ground not far from the muzzle of the piece.

It will be seen that in this modification of my war rocket, I have made the following improvements:—

First.—By the employment of a papier mâché cylinder which contains the rocket composition, all extremes of temperature are avoided.

Second.—Independent of the aid to rotation, given by the blades

of the screw at the end of the rod during its flight, a rapid supplementary motion has been *directly* imparted to the projectile, *ab initio*, by rifling the bush in the breech of the gun, together with the shaft or tail of the rocket, which latter is made hexagonal and rifled to fit the rifling in the bush, which shaft is thereby rotated in its passage through it.

Thirdly.—The head of the rocket not fitting or being of the same diameter as the calibre of the field piece is immaterial, as the annular papier mâché disc or wad fitted, behind the shoulder or head of the rocket, fills up the circumferential space ; and though light, will be found strong enough to resist the force of the discharge, and on leaving the muzzle and meeting the resistance of the atmosphere will at once be thrown back and fall to the ground.

Fourthly.—I purpose doing away with the bursting charges in the heads of war rockets, as adding greatly to the thickness of metal there, and consequent weight, without corresponding advantages, and filling up the vacant space with wood.

Although standing first on the list of destructive agents, these rocket projectiles might efficiently be made the means of saving many lives from shipwreck along our coasts, by establishing a rapid and certain communication with the shore. All that is necessary is, a short light gun or carronade such as most ships are ordinarily provided with. This gun to be fitted with a hole in the breech with plug to fit the same, together with a bush to fit the shaft of the rocket (in this case the rifling in both bush and shaft might be dispensed with on account of the additional expense.) The screw on the end of the rod is also not required, and the deep sea line is spliced on the end of the rod in its stead. The rocket being fired from the gun would carry one end of this deep sea line to the shore, by which means a ship's hawser would be hauled on shore, and the people passed over in the usual manner. This appears to me to possess great advantages over the life saving rocket apparatus at present in use, which is fired from the shore over the ship, and necessarily against a strong wind. I will not descant further upon its merits, to sailors they will be sufficiently obvious.

A. TAYLOR, LIEUT.-COLONEL,

8th Native Infantry.

NOTICE.

THE subject of the Essay for "The Durand Medal" for 1874 will be as follows :—

On the organization of the Intelligence and Topographical Department, best calculated to meet the requirements of the Army in India. It is suggested, but not insisted upon that the subject should be treated under the following heads :—

(a) Remarkable instances when the want of information has injuriously affected the operations of British and Indian Armies.

(b) Instances in General Military History when good intelligence arrangements have markedly added to the success of operations.

(c) Arrangements for the collection of Military Information in peace and in war, either adopted by the most celebrated Commanders of former years, or at present existing in the Chief Armies of the world.

(d) Proposed organization for the collection and arrangement of Military information in peace, and for gaining intelligence in war; suitable to the Army in India, and showing in detail, cost, establishment, etc,

(e) No essay to exceed 100 pages.

(f) Open to all ranks of H. M.'s Army and Volunteers in India.

(g) Essays to be published (if deemed advisable) in the Journal.

(h) Each essay to be distinguished by a *nom de plume* and forwarded to the *Secretary at Simla* by the 1st November 1874—to whom also the writer's real name and address should be sent in a closed envelope.

(i) Lieut.-Colonel F. S. Roberts, Offg. Quarter Master General, has kindly consented to decide on the respective merits of the Essays.

H. H. STANSFELD, *Lieut.-Colonel,*
Secretary.

NOTICE.

MEMBERS of the Institution who have not already done so, are earnestly requested to pay their arrears of donation and subscription, either to the Corresponding Members at their stations, or direct to the Secretary at Simla.

Some members still owe their donation and three years' subscription.

Officers, who may wish to become members are requested to be kind enough to forward their donations and subscriptions at the same time as they express a wish to join the Institution, and also to inform the Secretary, whether their subscription is intended to be for the current year which ends on the 31st May.

Members can pay their subscriptions to the Alliance Bank Simla, if more convenient, and the Bank will grant receipts for any money sent.

It is hereby notified for the information of Members of the Institution that the Exhibition of Military Drawings unavoidably postponed from last September will be held at Simla in September 1874, all drawings intended for competition to be with the Secretary by the 1st of that month.

The prizes will be awarded by a Committee of the Council.

There is no limit or condition as to style, or subject of the drawings for this year's Exhibition, but it is considered advisable by the Council that only Military men should contribute. Drawings of Fortification and Artillery will also be allowed to compete.

H. H. STANSFELD, LIEUT.-COLONEL,
Secretary.

NOTICE.

MEMBERS on changing their addresses are particularly requested to notify the change to the Secretary, in order that delay in forwarding the Journals may be avoided as much as possible.

The address book is corrected up to date from the Army Lists, but mistakes are occasionally unavoidable unless members themselves promptly notify their change of residence.

Members proceeding to England on leave, who wish the Journal to be forwarded to them while absent from India should inform the Secretary, and send stamps for the overland postage by Brindisi or Southampton as they may wish.

When a member appears in orders for leave to England, his Journal is not despatched unless he asks for it, and while absent from India his subscription is not payable unless the Journal is supplied.

Members on return from furlough can obtain the numbers of the Journal that have been published during their absence by paying the subscription for that period, and all members on returning to India should inform the Secretary of the fact at once.

H. H. STANSFELD, LIEUT.-COLONEL,

Secretary.

ORIGINAL PAPERS.

I. COMPANY LECTURE.

PREFATORY REMARKS.

A LECTURE is admitted as being one of the best means for imparting instruction. For conveying knowledge to the soldier, the Captain of a man's Company is naturally the person most fit and most likely to gain his attention. One of the many changes that are taking place, is the recognition of the increased importance of a Captain of a Company.

That importance is not lightly obtained, for whereas on the one hand interference in detail is becoming a thing of the past, so also is responsibility increased, and work has to be done with a will. The hot weather now approaching will give many Captains the opportunity of preparing and delivering Lectures to their men, and it will be found that even the mildest efforts will be listened to with interest and attention. Could not Captains afford mutual assistance to each other by communicating Lectures they had found effective to the U. S. I. Journal? it being understood that they are not communicated for the instruction of the enlightened readers but as *bond fide* addresses adapted for non-commissioned officers and soldiers. From their publication criticism and discussion might arise, but all this will tend to produce benefit.

The following Lecture was delivered to some of the non-commissioned Officers and men of the 14th Regiment. It is put forward as a venture on the path I have indicated. It will be found after one Address, that by explaining certain details which present themselves, topics for future Lectures will readily be found.

Explanatory of the necessity for the Tactical Instruction of all Soldiers in time of Peace.

It has become an article of belief for the soldier, which cannot be controverted, that "the demands upon his skill and readiness in time of war are so many, that his Instruction and Training in time of Peace becomes a necessity."

We need not even wait for war to derive some benefit from good instruction. Take an ordinary march : its regularity, the rapidity with which the camp is pitched, the comfort and punctuality of the meals, the confidence which the Commanding Officer feels in granting indulgences to his subordinates ; do not all these hinge upon good instruction ?

If I ask you regarding the skill with which so many of you handle your rifles and for which you wear distinctive badges, must you not acknowledge that the foundation of that skill was—careful instruction ?

In time of danger who amongst you would not cast in his lot with comrades well-drilled and well-trained, rather than with the ignorant and unskilled, however brave these latter might be ?

The conditions of the particular knowledge we are seeking to obtain are ever changing ; new inventions, the perfecting of the old, especially upon us as soldiers, make their influence felt, and so our field of investigation is boundless. We know well the truth of the saying : Art is long and Life is short.

With knowledge as its motive power, Civilization strides on, the “slow march” of the past is replaced by the “double” of the present ; in former ages the steps were slow and wavering, now the pace increases, and the tread is firm.

Slow was the stride, from the club found ready to hand, to the knife and bow : then the horseman and the chariot with the use of defensive armour proclaimed that skill in the tactical use of weapons was asserting its value. The arrow next is displaced by the bullet propelled from the rude iron tube, and in our time we have the breech-loading rifled musket, the rifled cannon, and the armour plate. The steam engine and the electric telegraph also assert their influence in all theatres of war.

Side by side with these improvements in weapons, the knowledge of their proper tactical use must keep pace, and this requisite knowledge can only be obtained by the instruction of those in whose hands weapons are confided ; and as the athlete practises with unwearying self-denial for the attainment of the prize he has in view, so should we as soldiers endeavour, by every means in our power, to maintain that pre-eminence in our noble profession which will keep the British Army the sure defence of its country's liberty and the pillar of its greatness.

The paths of knowledge that lie before us are so many, in the pursuit of which the advantage to the soldier is manifest, that the difficulty arises in discerning what points can claim our attention with the greatest advantage. Of materials there is abundance : the selection requires thought.

I have read of a Persian Vizier—Sádi tells the story—whose eloquence was praised, by recording that, if he had even to repeat the same thing over and over again, what he said appeared fresh matter from the power he possessed of clothing the old idea in new words. It struck me

on reading this, that if his lot had been to impart instruction to a modern soldier, his fame which has existed now for over 500 years, could never have arisen, as the number of new ideas would never have given him the chance of producing an old one a second time.

Let us see what these demands upon the skill of the soldier are to which we have made allusion. In days gone by, a mechanical knowledge of his drill and implicit obedience of orders was nearly all that was expected from him. Now however, armed to perfection, he is opposed to enemies equally well armed and highly instructed. To bring himself on an equality with these, he must add to the above a thorough knowledge of the powers of his weapon, quickness in correctly appreciating the advantages to be gained from the configuration of the ground, and above all to fully retain the power of passing from independence of action to an entire abnegation of self, when passive obedience is demanded. The physical and mental training of the soldier will be specially tested upon the field of battle, as the fundamental rules of strategy have been but slightly modified, whilst the tactical handling of the three arms, has had important changes forced upon it, and thus amongst other things Infantry now requires a special training in Battle Tactics.

The proposition before us is now reduced into considering the best manner in which the Infantry soldier, with or without assistance of the other two arms of the service, (Artillery and Cavalry) can assail or repel the attack of his enemy in the field.

We shall be able better to understand the tactical changes resulting from the improved armament of the soldier, if we put before us some one battle typical of the past, and see what success could have been expected from the tactics adopted by the respective Commanders, supposing their troops to be armed as they are at present. We all of us know something, be it more or less, of Waterloo, with Wellington and Napoleon as their leaders.

Napoleon, after his escape from Elba, advances upon Brussels, his army is over 71,000 strong ; of these 15,000 are Cavalry, and his Artillery numbered 246 guns. Wellington barred his advance with an army of 68,000 men and 156 guns, and expecting to be joined by his allies the Prussians, who were hastening to join his left flank, he took up his position at Waterloo. The main line of his army was posted on the reverse slope of a range of heights, but he occupied two advanced posts, viz., the Chateau of Hugoumont on the right, and the farm of La Haye Saint in the centre. The former was held all through the day by the British Guards, who before the battle improved the defences of the buildings. The latter was garrisoned by the German Legion, who however, when their ammunition was exhausted, were after an heroic defence, driven out. Wellington thus awaited the attack of the French, which for some reason, not clearly explained, was delayed until 10-30 A.M. ; and now how was that attack delivered ? Deep columns of attack, covered by skirmishers, advanced in full view. First the right, then the centre and the

left of the British position were assaulted unsuccessfully. These Infantry attacks were supplemented by two assaults made by the French Cavalry, who most gallantly but vainly rode at and round the British squares, endeavouring to find an entry; foiled in their attempt they were driven out of the position by our Cavalry.

Towards evening, a last grand attack by the French Imperial Guard was delivered and repulsed. Wellington, noticing the signs of disorganization which were now apparent in the French Army, passed from the defensive into the offensive, ordered the British Line to advance, and the day was won. The French Army was routed, and the Prussians arriving on the field of battle, carried on the pursuit during the night. Here we may put two questions before us for consideration; first, would Wellington have made the same disposition of his troops supposing they had been armed with breech-loading rifles and rifled cannon; and secondly, would Napoleon have made the same tactical arrangements for attacking him.

I think a little information here may add weight to the "no" you are doubtless prepared to utter. Of the powers of the modern rifle I am very glad to say the British Army has a very fair notion; though even here I think we have something still to learn regarding concentrated fire, but I think I might with advantage tell you of the field gun now in the hands of the British Artillery, which very luckily for them is a wonderful improvement on the arm which played its part at Waterloo. When we are acquainted with its powers we shall know the very worst regarding the effects an enemy's artillery can produce on us, and know how to deal with it to the best advantage; and further we shall acquire no small confidence from the aid we may expect from our own guns.

The present British field gun is a rifle muzzle-loading 16-pounder, its projectiles are common shell, shrapnel shell and case; the range of the two former extends to over 3500 yards, but shrapnel shell, for reasons which I will explain is not effective much beyond 2000 yards. Both these shells which are conical contain bursting charges of powder which are ignited by time fuses. The common shell which contains nothing but powder in its cavity projects its pieces with great force when its bursting charge ignites, whereas the shrapnel shell is filled with bullets and only carries a sufficient bursting charge in separate chamber in its rear to open the shell and release those bullets; the effect of these and of the shell fragments thus depending on the velocity contained in a shell at the moment of ignition of the bursting charge; this has not been found sufficient at the extreme ranges; case shot is only used at the shorter ranges. The lateral error in the laying of a gun is but small, and troops in motion find their safety from the misjudging of distance, and thus a broad shallow formation is forced upon Infantry when exposed to Artillery fire; that is line, instead of column.

The Infantry arm at Waterloo was the flint musket and the Artillery had the smooth-bore brass field gun; the range of the former did

not extend beyond 300 yards, nor the latter beyond 1,200. We leave out of the question, the marked difference in the destructive effects of the different classes of projectiles.

I hope that I have now put before you with sufficient clearness the grounds upon which a change in the tactical handling of troops has become necessary.

The range of heights from which the French advanced being only some 2,000 or 3,000 yards from the British position, we may safely presume that had Wellington's Army possessed modern weapons, their disposition would have been such, as to have rendered any attack by heavy columns like those employed by the French, impossible from the commencement. And whilst we can make this assertion on the one hand, so we can also say on the other that the French, equally well armed, would have conducted their attack on different principles. As we now know something of the Battle of Waterloo, I propose reading to you some remarks made by an eminent engineer officer of our service regarding the ground upon which it was fought. These remarks were made in the year 1816, one year after the battle was fought ; and if they were applicable then, what weight do they not possess now in these days of improved rifled weapons. The officer I allude to is Sir John Burgoyne, who after taking a distinguished part in the battles and sieges in the Peninsula under Wellington, in our day pointed out the key of the Defences of Sebastapol and after much opposition was proved to have been right. He says regarding the ground on which the battle was fought, that "The Field of Waterloo is frequently accounted as no position ; on inspection however, "without which it is impossible to have a perfect idea of ground, it is "certainly favorable for giving battle on, and if a little work could have "been done on it, might have been made excellent. It was not that "commanding kind of position that is sometimes found, and which "strikes the eye at once ! on the contrary, the ridge occupied by our "army is lower than the heights a mile or two in front, from whence "the French army advanced. But it still had many of the essentials "of a good fighting position. The flanks were on commanding points "that discovered the ground well all round them, at a fair distance from "the main road by which the enemy approached, and would have required him to make a considerable detour across the country to have "turned them. The whole being about a mile and a half or two miles "in extent, it was therefore very compact. The ground in front of the "centre and right was more broken, but the hollows were well looked "into by the chateau of Hugoumont in front of the right, and the farm "of Haye Sainte on the high road. The whole line was on a ridge which, "rounding back to the rear, covered the troops from the sight and from "the direct fire of the enemy. Such was the nature of our ground. "Even a single company of Sappers with their tools might, in a very "few hours, have rendered most essential service in improving it, by "preparing the two buildings for defence. The Guards did to the chateau of Hugoumont what was necessary for its defence. Had La

"Haye Sainte been loopholed, all its doors and approaches towards the front and flanks been strongly barricaded, and a communication made to the rear, it would probably have been held through the whole day."

(The lecturer can here mark upon a black board with chalk, two ranges of heights, the one held by the British, the other opposite being that from which the French attacked; Hugoumont and La Haye Saint can be shewn in advance of Wellington's main line, the road to Brussels also should be indicated).

At some future day we might, as Infantry soldiers find ourselves, before a contest such as Waterloo, detailed for outpost duty, or we might be a portion of the force to whom the preparation for defence of either of the two advanced farm buildings and the subsequent holding of them, had been entrusted; or we may safely assume that with modern weapons the connection of the salient Buildings by hasty entrenchments would be decided on, and so our lot might have been to dig shelter trenches and then to defend them, until the moment for advance arrived. Here we have before us several matters on which the soldier needs instruction. Now certainly, on some of these points armies in former days were instructed, but their shooting had been acquired before the enemy in the field, a heavy price had been paid for this practical experience gained in time of war. Nations now, enlisting science and inventions in their cause, step ready prepared for contest into the arena. A people, even prepared to pay a heavy price for dilatoriness and present ease, would not be granted time to count out its money, the sleeper would barely have time to rub his eyes before he would be fettered with other bonds of unconsciousness.

There will be but little sparring before the blow. Hereafter history will not tell of thirty years' wars or seven years' wars. We know the results of even one campaign. I hope instruction will come kindly to most of us. The skill required of the soldier now adds dignity to our profession, and further the knowledge we seek after is not dry or unattractive.

Have I thus shown why the soldier must be trained and instructed in time of peace, so as to be prepared to fill his place successfully in time of war.

D. WARREN, *Major,*
1-14th Regiment.

II.

MESSES OF NATIVE INFANTRY REGIMENTS.

THIS subject is one that requires discussion, and if these few remarks help to extract the opinions of others of my brother officers, and so ventilate the matter thoroughly, my object will be gained ; for I feel certain that the rottenness of the present system once satisfactorily proved, Government will come to the rescue and place our Messes upon a better footing.

There are few Messes which are not more or less in debt ; some have not even the common necessities of the dining table, and but few are really well equipped. With house rent at its present high rate, and servants' wages rising yearly, the Mess Fund cannot afford to buy plate, linen, glass, camp furniture, pay for its carriage on the march, and at the same time clear off any debts which may have been contracted by former or present members. No individual member or body of officers care to spend money in fitting up a Mess, to which a year hence they may not belong, and so things go on from bad to worse. The quarterly accounts may shew a balance in favour of the Mess, but were the stores in godown to be sold off, it would be found that the prices put upon them could hardly ever be realized; and as the stores are the chief part of the property to weigh against the debts, the prices being fictitious, however careful the committee, the balance to credit in the books will also be the same.

There are some happy exceptions to this state of affairs, but they are few. There is a want of interest in the Mess, partly because in most regiments there are so many appointments held by officiating officers, who are here to-day and gone to-morrow. In those where there is "*esprit de corps*," the burden of keeping up the name of the regiment falls heavily upon the seven or eight members, some of whom are married and unable to afford the expense of entertaining in the manner that is expected from Messes of the present day. Before the Mutiny, when a regiment consisted of twelve or fourteen officers, expensive wines were the exception, now they are the rule. In most private houses beer and light claret are to be found, at a Mess however small, champagne, &c., must always be opened. It is a pity, but such is the custom of the day. In all regiments two or three if not more of the officers are married, thus only four or five are dining members. During the leave-season two of these are generally absent, leaving three at the most to bear all the expenses of ice, lighting, punkah coolies, &c. These three attend Mess nearly every night, and let them be ever such good companions, they must tire of each other's society.

To obviate all this, I would propose that where two or more regiments are stationed together, as is the case in fourteen or fifteen stations in the Bengal Presidency, there should be *Station Messes* or Clubs.

As an example, to shew the waste of the Government allowance of

Rs. 100, and subscriptions from members, take the station of Rawul Pindee. There is one Cavalry and two Native Infantry regiments. The three Messes have three good houses, averaging from Rs. 60 or Rs. 80 each, say Rs. 220 for the three. The wages of the servants of these Messes being about Rs. 180, that is Rs. 400 per mensem. At each Mess there are not more than three dining members. If the three Messes were amalgamated, one good house at Rs. 100 and servants at Rs. 80 would do for all, effecting a saving to each Mess Fund of nearly Rs. 80 a month.

To keep up such a Mess or Club, let each regiment give a moiety of its Government allowance, the remainder going to form a Regimental Mess Fund, which will be of use when it is stationed by itself; and in the same way pay half its subscriptions, *viz.* Rs. 4 or Rs. 2-8 as the case may be, for each member present. This would pay for house rent and servants, and any balance over would go towards forming a fund for the purchase of linen, plate, &c. Each regiment should give its quota of lamps and furniture, and on leaving the station receive their then value from the Fund, the relieving regiment if coming from a single corps station, paying a small donation on joining.

Committees might be convened at each station where these Messes are to be formed, to enquire into the state of the Mess Funds, and to determine how much of their surplus funds (if any) should be given over to the Station Mess. Members of Messes whose funds are rich may object to giving up any portion of them, but they should remember how few of the present members, if any, have contributed to this surplus, taking into consideration the great number of changes that occur in regiments from year to year. It would only be at first that difficulties would arise for funds to fit up these Messes. Many officers on the staff and doing general duty would be glad to join them, and their subscriptions would help to keep up the funds.

Each regiment has a Book Club, amalgamate them, and after a time, a really good useful Library will be formed.

The Mess to be conducted by a committee composed of an officer from each regiment to be chosen quarterly. The Officer Commanding the station to be ex-officio president; and commanding officers to take it in turn each quarter, to act as vice-president, when the accounts should be made up and examined.

A Station Mess could then afford to receive and entertain its brethren of the British Army, and whilst being a great saving to regiments, it would be no extra expense to Government, indeed after a few years the allowance now given might be reduced.

The married members would continue to pay their subscription as now, but they would not be called upon to entertain so largely. A regiment would still keep up its camp furniture, plate, &c., for the time when it is in a single corps station. One servant would be sufficient to take care of it, whilst the Fund would be accumulating at the

rate of Rs. 70 or Rs. 80 a month, so that at the end of a three years sojourn in a large station it would have nearly Rs. 3,000 in hand.

It will be said that there are so few large stations in which these Messes could be formed. Each regiment will have its turn of one of these, and during that time can form a Fund, or if involved get out of its difficulties.

No one should be allowed to join these Messes but members of the service, civil and military, and it will rest with the authorities to decide, whether uniform or otherwise should be worn.

I trust these ideas thus roughly given may be productive of some good, for the present state of Regimental Messes is most unsatisfactory.

H. FELLOWES, MAJOR,

23rd P. N. I.

Rs. 100, and subscriptions from members, take the station of Rawul Pindee. There is one Cavalry and two Native Infantry regiments. The three Messes have three good houses, averaging from Rs. 60 or Rs. 80 each, say Rs. 220 for the three. The wages of the servants of these Messes being about Rs. 180, that is Rs. 400 per mensem. At each Mess there are not more than three dining members. If the three Messes were amalgamated, one good house at Rs. 100 and servants at Rs. 80 would do for all, effecting a saving to each Mess Fund of nearly Rs. 80 a month.

To keep up such a Mess or Club, let each regiment give a moiety of its Government allowance, the remainder going to form a Regimental Mess Fund, which will be of use when it is stationed by itself; and in the same way pay half its subscriptions, *viz.* Rs. 4 or Rs. 2-8 as the case may be, for each member present. This would pay for house rent and servants, and any balance over would go towards forming a fund for the purchase of linen, plate, &c. Each regiment should give its quota of lamps and furniture, and on leaving the station receive their then value from the Fund, the relieving regiment if coming from a single corps station, paying a small donation on joining.

Committees might be convened at each station where these Messes are to be formed, to enquire into the state of the Mess Funds, and to determine how much of their surplus funds (if any) should be given over to the Station Mess. Members of Messes whose funds are rich may object to giving up any portion of them, but they should remember how few of the present members, if any, have contributed to this surplus, taking into consideration the great number of changes that occur in regiments from year to year. It would only be at first that difficulties would arise for funds to fit up these Messes. Many officers on the staff and doing general duty would be glad to join them, and their subscriptions would help to keep up the funds.

Each regiment has a Book Club, amalgamate them, and after a time, a really good useful Library will be formed.

The Mess to be conducted by a committee composed of an officer from each regiment to be chosen quarterly. The Officer Commanding the station to be ex-officio president; and commanding officers to take it in turn each quarter, to act as vice-president, when the accounts should be made up and examined.

A Station Mess could then afford to receive and entertain its brethren of the British Army, and whilst being a great saving to regiments, it would be no extra expense to Government, indeed after a few years the allowance now given might be reduced.

The married members would continue to pay their subscription as now, but they would not be called upon to entertain so largely. A regiment would still keep up its camp furniture, plate, &c., for the time when it is in a single corps station. One servant would be sufficient to take care of it, whilst the Fund would be accumulating at the

rate of Rs. 70 or Rs. 80 a month, so that at the end of a three years sojourn in a large station it would have nearly Rs. 3,000 in hand.

It will be said that there are so few large stations in which these Messes could be formed. Each regiment will have its turn of one of these, and during that time can form a Fund, or if involved get out of its difficulties.

No one should be allowed to join these Messes but members of the service, civil and military, and it will rest with the authorities to decide, whether uniform or otherwise should be worn.

I trust these ideas thus roughly given may be productive of some good, for the present state of Regimental Messes is most unsatisfactory.

H. FELLOWES, MAJOR,

23rd P. N. I.

of arms and carriages, which up to the present time has been confided to Government establishments. For the better solution of this question it is of the greatest importance to know what is done in other countries; the problem everywhere has the same conditions: on the one hand to protect the interests of finance, and on the other, to be always ready to provide armies rapidly with an efficient matériel, satisfying all the exigencies of the service.

FRANCE.

Before passing in review the systems of other countries we may briefly state the present practice of France. The service of the forges furnishes the castings and the iron and steel necessary for the different requirements of artillery, and to this end contracts are made with the iron masters, and executed under the superintendence of officers and military employés.

The *Arsenals of construction* manufacture and repair the carriages, waggons and implements of the artillery. In each arsenal committees of officers are charged with the receipt of the various woods and metals. The work is executed by artillery workmen, assisted according to circumstances by civil workmen and by military artificers detached from regiments. A committee of artillery officers is charged with visiting and taking over the work done. All the arsenals are provided with machines worked by water or steam power.

The *Foundries* furnish the artillery with bronze guns, with pipe boxes and with elevating screws. The work is executed by private or Government civil workmen under the direction of officers and officials of the artillery. The committee composed of artillery officers, a part of whom belong solely to the Foundry, inspect, prove, and receive the work done.

The *manufactories of Small Arms* are in the hands of private industry, the work done being supervised by officers of artillery. The arms are made by civil workmen and by military artificers detached from their corps. The three manufactories are completely furnished with tools and machines for mechanical work.

The *Powder Factories* are worked with economy. The manufacture is confided to companies of artificers, the most delicate portion of the work being done by civil workmen, who are powder-makers by profession.

Lastly, the workshops of the "*Central School of Military Pyrotechny*" prepare the combustible matériel of war, the work being done by military artificers.

To sum up, the French artillery leaves to private industry all work, the quality of which can be easily verified on receipt. On the other hand, all the material, whose defects cannot be recognised with certainty by proof on receipt, is manufactured by the artillery in its own workshops.

Lastly, with regard to the personnel of the workshops, the military element is largely utilised, while civil workmen are employed on that kind of labour which demands special or peculiar skill.

ENGLAND.

The industry of England applied to war matériel is very flourishing, for she possesses in herself abundant iron and coal, and her skilled workmen enable the government to depend largely upon private work, while at the same time it takes care to encourage and develop the military manufactories.

Enfield Small Arms Factory.—Prior to the Crimean War, Enfield was quite unable even in time of peace to supply the wants of the army. Although private factories were immediately and largely drawn upon, the experience of the first demand of the war decided the Government to establish at Enfield a large factory worked by machine power. The new works were commenced in 1855, and the following year the manufacture proceeded regularly under Colonel Dixon.

The Royal Factory at Enfield is the only State manufactory of small arms. In 1854 the workmen did not number more than 700, but the figure is now raised to 2,000.* The factory can turn out 1,000 rifles per diem. There are two classes of *employés* at Enfield. Those belonging to the one are specially charged with manufacture, and superintend and direct the work, proposing where necessary any improvements in the tools or machines. The others test the work produced, control it, and examine the modifications proposed. At the head of each branch is placed an engineer and controller under the orders of the superintendent. The work is task-work paid under a tariff of the superintendent.

Pimlico is the establishment where the repairs of small arms are effected, and there also is established a practical school for armorers.

In addition to the manufacturing power of Enfield, Government also enlists the resources of private industry.

Swords, bayonets, &c., are furnished from Birmingham, and Solingen in Rhenish Prussia.

The inspection, control, and receipt of these arms is conducted at Birmingham in an establishment directed by two Assistant Superintendents of small arms who are artillery officers. The State does not wish to deprive itself entirely of the assistance of private industry, where precious resources exist. But on the other hand it has not, as in France, relegated its military manufactures to ordinary enterprise, nor, thanks to the development of the arm trade, is it necessary as in that country to engage permanent workmen.

Royal Powder Factory at Waltham.—This powder factory situated near Enfield produces yearly about a third of the consumption of the Army and Navy.

* 1611 in 1873. It must be remembered that our author speaks of a year or two ago.—E. H. H. C.

The Manufactory, it is true, can double or treble this amount, but the State, in order to supplement its production prefers to employ private industry, finding it an advantage to excite the rivalry of the manufacturers in the perfection of the powder and the lowering of its price. Charcoal and sulphur are procured by the trade, but it is obliged to sell to Government the whole of the saltpetre. Special agents and officers of artillery control its manufacture, and the products are sent to the depot at Purfleet where they are analysed and proved. Up to the present time the State has not had much to complain of in regard to the trade, but neither is it held at its mercy, and for this reason it preserves the Powder Factory.

Woolwich Arsenal.—The Arsenal of Woolwich can furnish all the matériel of war necessary for the equipment of the fleet or of a large army. This immense establishment, which employs from 2500 to 3000 workmen,* manufactures guns, carriages, waggons, projectiles and all the combustible material of war, even paper cartridges and musket bullets.

Sir William Armstrong was named Superintendent of the Foundry after the introduction of his system of artillery, but since 1864 his connection with the State ceased, and he has been the head of the Elswick Ordnance Company. This company has manufactured both for the English Government and for foreign powers. To the first devotion to his system a revulsion of public opinion succeeded. The naval guns were replaced by muzzle-loading pieces, much resembling the first rifled guns of the French navy.

As for field artillery the adoption of a muzzle-loading gun has been insisted upon by various committees since 1866; Colonel Maxwell after several trials proposed a modified French rifling which was adopted, first for Indian service, and subsequently generally. The change in field artillery matériel has commenced since the end of 1870.

The change is not only in the guns, but also in the carriages and waggons which are being constructed of iron. Such is the motive power and working elasticity of the Woolwich Arsenal, that the new manufacture was commenced immediately, and at the present time the change of matériel has been accomplished for England, and is being rapidly proceeded with in India. The machinery and working power in every department of the Arsenal is so arranged, that it can turn out daily a complete battery, *i. e.*, six guns, twelve waggons, one forge, one general service wagon, one store limber wagon, one store-cart, with ammunition and harness complete; the ammunition boxes loaded; the tents, the tools and the camp stores in their proper place: in a word, the battery is ready, and nothing remains but to harness the horses.

The arsenal buys in the trade the metals which it works up for the manufacture of the different carriages.

* Nearly 6000 in 1873, *i. e.* including Gun factories, Royal Laboratory, and Carriage Department.—E. H. H. C.

Besides the Foundry and the workshops, Woolwich Arsenal possesses a *Royal Laboratory* where metal and wood fuzes, gun cartridges and projectiles, and small arm cartridges, in fact all the combustibles of war are prepared.

On such a footing as this, Woolwich Arsenal is nothing but a series of manufactories of war matériel, and it is natural to find the advantages of civil industry, economy of construction and rapid production.

In a country like England, the most industrial in the world, it is still good policy to have military manufactories. The forethought of the English Government had slumbered during a long peace; the Crimean War awoke it, and since that epoch its manufactories and workshops have been developed and transformed.

GERMANY.

The Prussian war matériel is so excellent, and obtained on such economical principles that we shall study in some detail the military establishments of Germany.

Arsenals of Spandau, Cologne and Dantzic.—For some years Prussia had four principal workshops (Werkstätte) for the construction and repair of artillery materials, which were at Berlin, Cologne, Neisse and Dantzic. But Prussia has now united all the workshops of construction at Spandau, which is the grand centre of its military establishments and was opened in the year 1866. The workshops of Cologne and Dantzic have been alone preserved for repairs. At the head of each arsenal is a director assisted by several assistants (directions assistenten.) The raw material, and certain articles, such as axletrees, are received from the trade. They are submitted to the examination of two commissions, the one dependent on the director is formed by the arsenal officers, and called the "arsenal commission of inspection; the other which is subordinated to the Inspector General of Artillery is composed of officers unconnected with the arsenal, and bears the name "Commission of artillery inspection." The first is charged to protect the interests of the Arsenal both technical and administrative; the second on the other hand protects the interests of the troops who will have to make use of the matériel.

The matériel received by the commissions was formerly worked up by divisions of artillery workmen; but Prussia which already employed a certain number of civil workmen in the Spandau arsenal, and which by its organisation can always find a sufficient personnel for the field parks, dissolved the divisions of artillery workmen on the 5th of May 1871, and only employs civil workmen at the present time.

The execution of the director's orders is confided to the officers of the "arsenal commission," who regulate and supervise the work of the foremen and the workmen. As soon as a certain number of articles are finished, whether they form a complete whole, or merely enter as elements in more important constructions, the Commission of artillery inspection assembles, examines, and receives the articles.

There are permanent committees of artillery inspection in the towns where the arsenals are, temporary committees being formed in all other places and artillery garrisons. Both are charged with examining matériel new or repaired coming from the workshops of the state or the trade; they receive the guns, inspect in the spring, field and fortress artillery, and also reassemble when there is any change of material of a battery or "ammunition column." This system of inspection insures the good condition of the matériel, and protects the responsibility of the officers in charge.

The Prussian Government being obliged to create all the matériel of the 4 pounder rifled batteries,* has had recourse to the trade to supplement the insufficiency of the manufacture in its arsenals.

There are two important facts to note, on the subject of the Prussian arsenals; firstly, the recent creation of a great arsenal of construction based on the employment of machinery; secondly, the abolition of the division of artillery workmen.

Artillery Dépôts serve as magazines for matériel, and exist in every fortress, and in the towns where the principal workshops are.

Gun and Projectile Foundry of Spandau.—The director is Captain Wever. One hears so much of the steel Krupp guns that one is astonished to see Prussia keeps up a Foundry for bronze guns. The employment of steel has however met with opposition. Among the arguments which the advocates of bronze employ, a chief one is that the block of steel for a field gun costs considerably more than for a bronze one. Besides, it may be advisable to be able to return to the old metal, and Prussia, possessing a great number of bronze guns, refounds these turning them into breech-loading pieces for the use of fortresses, position batteries, and batteries of sortie.

The personnel of the foundry of Spandau is composed of a director, an assistant director, the latter especially charged with the technical work, and a government officer responsible for the account duties. Besides the officers, the personnel comprises ten military employés; serjeants, and military clerks (zeng-sergeanten, zeugschreiber,)+ twenty civil workmen; foremen, assistants, artisans, and day labourers. The Foundry produces not only guns, but also projectiles (eisenmunition) on the one side it has master moulders, casters, and borers; and on the other master moulders of ammunition and a forgemaster. Spandau could scarcely furnish exclusively the projectiles required by the Prussian artillery, and consequently we find that the manufacturing firms of Krupp, Gruson, Berger, etc., turn out shells for government.

* I need not remind my readers that the Prussian 4 pounder is really equal to our 9 pounder guns.—E. H. H. C.

+ Magazine sergeants and arsenal clerks, answering also to the French 'gardiens d'artillerie.'—E. H. H. C.

The out-turn of the Spandau Foundry is first submitted to the examination of the Foundry Inspection Commission and afterwards to that of the Artillery Inspection Commission.

The steel guns of the Prussian Artillery are made at the manufactory of M. Krupp at Essen in Westphalia.

In 1865 this covered 700 Prussian acres. Exclusive of the iron and coal mines, the factory employed 9000 workmen, and used 75 steam engines. The steel foundry has 240 melting furnaces and 40 steam hammers.

Two-fifths of the steel cast is devoted to artillery. In 1866 Krupp had given over to Prussia, Russia, Belgium, and some other countries, 2600 guns, of which a third were of a large calibre, representing a value of 48 millions of francs ; under pressing circumstances Esser could turn out daily 3 to 5 field batteries.

Although large experience has been gained and bursting will become rarer, minor accidents are even now too frequent. At Rezonville and St Privat, a certain number of Prussian guns were rendered hors de combat by their own fire, and their repair took several days. The Germans say that these accidents have only happened to pieces, founded hastily at the commencement of the war, and it appears that in 1870 Krupp employed Bessemer steel and not cast steel, which latter material has alone given irreproachable results.

The manufacture of bronze guns had not in old times reached the degree of perfection which it has attained at the present time,* and we may hope that steel will in time rival bronze as an absolutely secure material.

Powder Factories of Spandau and Neisse.—Prussia possessed only these two in 1870.

The personnel of each comprises :

1st, Director, assistant director, both artillery officers.

2nd, Civil employes such as the Commissary of Finance (Rendant,) Inspector of Workshops (Betriebs-Inspektor) and the civil foremen and workmen.

The *Commission of Inspection* of the factory and the *Proof Commission* are charged with receiving the powder. The assistant director is president of the first committee and member of the second.

The inspector of workshops directs the manufacture of the powder.

Laboratory of Spandau.—Here the work is executed by two companies of military workmen. The direction of the establishment is com-

* We seem to have lost the art in England and in India. It must be remembered however that our rifled bronze guns, which burst were muzzle-loading.—E. H. H. C.

posed of the chief of the division of artificers, of the senior captain of the company, and a financial officer.

There are two branches of manufacture: (a) rockets, (b) all other kinds of combustible matériel. At the head of each is a captain of company. The other officers of the division are employed in the manipulation or inspection of the matériel.

The *Commission of Inspection* examines the raw material from the trade, visits and receives the laboratory productions.

Strict precautions are taken to ensure the manufactures being conducted in secrecy, only Princes of Royal Blood and certain general officers specially appointed have the right to enter the workshops, and the most solemn oaths have to be taken by the employés and workers in all the artillery establishments.

Small Arms Factories of Spandau, Erfurth and Dantzig.—Prussia obtains arms partly from the above and partly from private manufactories at Sonnerda and Suhl. The Royal manufactories are also schools of instruction for government and regimental armorers.

The *personnel* comprises artillery officers who are directors and assistant directors, civil government officers, and clerks, civil employés, such as foremen of workshops (Betriebs-führer), chief armorers, and, mechanical engineers, and lastly, all the workmen classed as master artificers and apprentices.

The *direction* is composed of the director, the senior assistant technical member and a government officer, the administrative officer charged with the finance.

The technical member of the direction presides over the commissions for inspection of raw material, and in conjunction with an officer named by the director has the final review of the arms turned out.

In the case of private factories, a commission of inspection is charged with receiving the rifles, ammunition, and steel weapons; each committee is composed of a president, a technical and an administrative member. To this is added a convenient number of 'viewers.' The committee is responsible for the quality of the objects it receives, but it is not allowed to intermeddle in the method and conduct of the work.

One of these private factories, that of Sonnerda, has been founded by Dreyse. The Government desired to honor the inventor of the needle gun, and has given him numerous commands with a view not only of recompensing a man so useful to his country, but to encourage him to labour towards the perfection of his system, and to inspire the army with a high confidence in the arm which was in use.

These remarks will show the minute care which the Prussian artillery brings to bear on every portion of the work.

The fortress of Spandau thus embraces a manufactory of arms, a laboratory, powder factory, a gun and projectile foundry, and a great arsenal of construction. These establishments have been there installed for 20 years, and Berlin which formerly possessed several has none any longer, Spandau thus forming the centre of military industry, and the last defensive resource and reduit against foreign invasion.

Before the war of 1866 the minor states of the Germanic confederation had organised, each according to its own importance, artillery establishments. Saxony had a foundry, and workshop at Dresden; Wurtemberg an arsenal at Ludwigsburg; the grand Duchy of Baden one at Carlsruhe; Hesse-Darmstadt at Darmstadt; Bavaria possessed a gun-foundry at Augsburg, a small arms factory at Amberg, and arsenal, laboratory and powder factory at Munich. At the present time the tendency is to abolish the different establishments of the secondary states. Bavaria has up to this date resisted these changes and has preserved a relative independence in the manufacture of arms and war matériel. The foundry at Augsburg still exists, and the factory of Amberg has manufactured the Werder rifles for the Bavarian army, and has been requisitioned for the construction of the Mauser rifles adopted for the rest of Imperial German army.

AUSTRIA-HUNGARY.

Austria without renouncing the right of making use of private industry and civil workmen has formed a corps of technical artillery destined to manufacture, and to deal with all the matériel of war—guns, small arms, carriage, ammunition, harness, &c. The personnel of the technical artillery attains a strength of 1800 men, and is distributed in 20 districts. Although Austria has numerous military establishments spread throughout the empire, she has concentrated the *production* of war matériel in the Imperial arsenal at Vienna.

Arsenal of Vienna.—The arsenal of construction and the dépôt were commenced in 1849 and finished in 1855. It extends over the heights of Laa beyond the Belvedere barrier. The workshops formerly scattered over the town are united here.

The arsenal contains :

1st. Workshops for the construction and repair of gun carriages, limbers and wagons, harness, armament and equipments, tools and machines, a laboratory, and a gas factory.

2nd. A *foundry* where guns are cast, bored and finished, and where iron castings are also worked on.

3rd. A *small arms factory* where all arms can be turned out, although the state draws in private industry : the Werndl rifles are manufactured at the civil factory of Steyer near Wiener-Neustadt. The arsenal authorities review the arms, submit them to various proofs, and

receive them after a second inspection. Considerable use is made of machine power, eleven steam engines and 450 machines being used chiefly in the bullet-factory and carriage factory.

The arsenal can turn out yearly 300,000 to 400,000 projectiles, review and prove 600,000 small arms ; cast 1,400 bronze guns, and produce besides 2,000 cwt. of bronze, and 5,000 cwt. of cast iron ; can construct 960 field gun carriages with limbers and wagons, and furnish harness complete for 1800 artillery carriages.

With these factories therefore we can explain the rapidity with which Austria has been able twice to change her artillery and replace the matériel lost at Königgratz. All the guns employed in the Bohemian campaign were rifled, whilst a third of the Prussian artillery was still armed with smoothbores. A director is at the head of the arsenal ; he has under his orders an "Arsenal Commission," and a "Commission for the receipt of matériel."

A company of technical artillery is specially charged with the works, and added to it are civil workmen and soldiers of the garrison.

Besides the workshops and magazines of the arsenal the Director has also under his direction the Laboratory and artillery dépôt of Steinfeld near Wiener-Neustadt.

The Vienna Arsenal, like that of Woolwich, offers a striking example of the employment of machinery and the assemblage of workshops, which elsewhere are often separated. Under these circumstances economy of work is a maximum.

Besides the Vienna Arsenal and its annexes, the Technical Artillery also possesses the following establishments :—

1. The powder factory of Stein, near Laybach, where sulphur and saltpetre are refined, and where gunpowder is made and stored.
2. The Artillery dépôts of Bergstadt, Carlsbourg, Carlstadt, Cattaro, Conorn, Cracovic, Essegg, Gratz, Insprück, Josephstadt, Lemberg, Linz, Olmutz, Pesth, Peterwardein, Pola, Prague, Ragusa, Temesvár, Theresienstadt, Trieste, Wiener-Neustadt and Zara.
3. The branches of these principal dépôts.
4. The artillery laboratories dependent on the principal dépôts : and in these are made the necessary ammunition for each district.

RUSSIA.

Russia has not been behind hand with improvement in manufacture, and uses every effort to enlist foreign skill in supplementing the somewhat backward condition of her own industry.

Small Arms Factories of Toul, Sestroretz, and Ijevsk.—Russia has been engaged in transforming the two former of her factories upon the system of large employment of machinery. The first is near St. Petersburg, and the second, founded by Peter the Great, near Moscow. The third also which is being transformed is in the province of Viatka.

Arsenals of Construction and Gun Foundries.—Russia has adopted the system of B. L. steel guns, and is one of Krupp's best customers ; but in order to proceed more rapidly with the re-armament of her artillery, she has armed part of it with bronze rifled field guns, as well as siege and garrison, and has also cast iron garrison guns.

The St. Petersburg workshop (founded in 1866) is confined chiefly to the finishing of B. L. guns and the manufacture of the breech closing arrangements. It counts 300 workmen, and can turn out yearly 350 field and mountain guns and 350 siege and garrison pieces. The Foundries of St. Petersburg furnish bronze guns for finishing, and Perm, Verkhne-Tourinsk and Alexandrow-Olonetz, iron pieces.

The Foundry of St. Petersburg forms part of the new arsenal of that city, and employs 500 workmen, the outturn being 300 4 pr. and 9 pr. field guns ; 200 siege or garrison, 200 iron-plate carriages and wagons.

The *Arsenal of Briansk*, in the Government of Orel, turns out 200 bronze guns yearly, and manufactures 100 iron-plate gun carriages and 300 to 500 artillery carriages.

It employs 500 to 700 workmen.

The *Arsenal of Kiew* employs 500 workmen and produces annually 100 iron-plate gun carriages, 150 wagons, &c. It has no Foundry.

Metallurgical Establishment for iron, and steel.—Furnishing projectiles and guns are :

1. *Alexandrow-Olonetz* (Government of Olonetz) for cast iron 12 and 24 pounders, and projectiles of 4, 9, 12 and 24 lb. It produced in 1870, 113,000 projectiles and 70 guns, which were rifled and finished at St. Petersburg.

2. *Longane* (Government of Ekaterinaslow) which furnishes projectiles and percussion fuzes (in 1870, 64,000 projectiles, 70,000 fuzes).

3. The establishments of the Oural—

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(c) *Forges of Kamensk, Nijne-Isetsk. Werkhné-Tourinsk, Barontschin, Zlatonstow, &c.* casting projectiles of all natures. The workmen employed are civil, but in all these establishments here are 20 local detachments, under the head of services auxiliary to the army, corresponding to the French artillery artificer workmen. Under the new organisation it is intended to form four mobile (field arsenal) workshops for field repairs. During peace the material of these parks is stored at St. Petersburg, Varsovia, Kiew and Novogeorgiewsk (Government of the Kherson.)

MM. Poolechow and Oboukhow have recently founded at Colpino near St. Petersburg a factory destined to manufacture steel guns and capable of producing weekly 10 coast guns.

The Russian artillery appears well satisfied with the products of this establishment, and no more orders will probably be necessary to Krupp.

Imperial Powder Factories.—1. Ochta near St. Petersburg, makes prismatic powder, produce 1,763,200 lbs. yearly.

2. *Schosta* (Government of Tchernigow,) about 1,432,600 lbs. yearly.

3.—*Kasan*, a somewhat smaller quantity.

ITALY

Has workshops of construction at Naples and Turin; small arms factories at Bresau, Torre-Annunziata near Naples, and Turin; a saltpetre refinery at Gênes; gun foundries at Naples and Turin. Powder factories at Fassano and Scafati, and a laboratory at Turin. Turin is the principal centre of military manufacture; Naples being in second line.

SPAIN.

The Spanish artillery establishments were in 1871, the following—

1.—The arsenal of Séville, which replaced in 1867 the five arsenals of Barcelona, Madrid, Corogne, Carthagena, Santa Cruz. This arsenal has two steam engines and various machines and also a cartridge factory.

2.—Gun foundry of Séville.

3.—Steel side arms factory of Toledo.

4.—Foundry of Trubia, where guns and projectiles are made.

5.—Small arms factory at Oviedo.

6.—Powder factory of Murcia.

7.—Powder factory of Grenada.

8.—Laboratory of Séville.

9.—Factory of Orbaicete (Pyrenees.)

BELGIUM.

The Belgian Artillery draws its steel guns from the Essen factory.

The *Royal Gun foundry* at Liège is however still kept up, where bronze and cast-iron pieces are turned out for armament of fortresses.

Small Arms Factory at Liège, founded by Leopold I., employs a company of armorers but can be largely recruited from civil workmen.

Antwerp has an *arsenal of construction* and *Laboratory*. A company of military artificers is employed.

Powder factory of Wetteren band (commercial) supplies the State.

HOLLAND.

Gun Foundry at the Hague, great workshops of construction, small arms factory, laboratory and powder factory at Delft.

SWEDEN AND NORWAY.

The Swedish Artillery establishments are undeveloped.

Small Arms Factory at Eskiltima furnishing Remington rifles.

The powder factories are private establishments ; guns and projectiles furnished by the Foundries of Faisporg, Aker and Stafsjo, belonging to individuals.

DENMARK.

Gun and Projectile Foundry and *Powder Factory* (State) at Frederikswærk. Cast iron guns are drawn from Sweden. There is a Civil Small Arms Factory at Helleboeck.

Remington rifles from America. Artillery matériel in private factories supervised by Artillery officers at Copenhagen and Frederikswærk.

Arsenals for Store and Repair at Copenhagen, Helleboeck, Frederikswærk.

SWITZERLAND.

Federal Foundry of Aaran, where bronze guns on a new model are cast.

Wrought-iron Field guns in the foreign workshops of Carlsruhe.

Arsenals of construction at Berne and Thoune ; small Arms Factory at Thoune.

UNITED STATES

Have since the civil war depended almost absolutely on private industry. Since the war with England in 1812 America has only had war

with Mexico and Indian tribes, and has not had to fear invasion nor to provide a large permanent army or make great provision of matériel.

When the civil war broke out the Federal Government found itself without an army or war matériel. The arsenals were empty and the establishments unequal.

Government bought all the obtainable arms in Europe. The National Factory at Springfield was again put into full power, and a pressing appeal was made to private industry, which was responded to by Colt, Sharp, Remington, Burnside, Henry, Spencer, &c.

Springfield and Colt could turn out yearly 35,000 muskets.

Guns were obtained from the trade, and in 1865 in a report to the American Marine Minister the chief of the Artillery bureau, that the national industry could provide for all eventualities.

The *Chief Foundry* at New York belongs to Parrott, formerly Captain in the United Service Artillery, and casts iron guns for the Government; from 1860 to 1st April 1864, it has turned out 2,000 cannon from 10 to 300 pounds.

Foundry at Fort Pitt (1803.)

„ of Reading (Pennsylvania.)

„ South Boston (Massachusetts.)

„ Providence (Rhode Island.)

Arsenals 1, Watertown (Boston) ... 1200 workmen.

„ 2, Waterbet (New York) ... 800 „

„ 3, Washington ... 800 „

„ 4, Bridgeburg ... 1200 „

„ 5, St. Louis ... 600 „

„ 6, Alleghany ... 400 „

„ 7, Fort Munro ... 200 „

No. 1 furnished specially iron and wood gun carriages and harness.

No. 2 wood, &c., and harness.

Nos. 3 and 6 wood gun carriages.

No. 7 iron „ „

Supply also from private factories.

Powder, mainly from the civil factories of Brandywine and Hazardville. While the private industry of America has satisfied the Government we must not forget that under similar circumstances we require not only rapidity, but efficiency and economy.

The increase to the national debt of America shows what an improvised army and matériel cost.

It is difficult to pass judgment on the efficiency of the matériel. But the bursting of guns at the siege of Charlestown permit a doubt; and without question the armament and equipments bought by the French in America during the Franco-German war show that the manufacturers differed in their ideas both as to dimension and quality. America had no choice but to rely on private industry when sudden exigencies sprang up, but we may well hesitate to accept this as a permanent system. France unfortunately knows too well what "national manufacture" is, and the price it costs.

Let us now in conclusion briefly summarize the examination of the different systems under each heading.

Manufacture of small arms.—The general system is military factories for making and repair, directed by Artillery officers.

The system of direct manufacture is followed in England, Prussia, Austria, and Russia.

Some states however also obtain arms from the trade.

Gun foundries.—Are generally Government and directed by artillery officers, employing civil workmen.

Sweden however, having the best iron mines in the world, gets her guns from the trade.

Those countries which have adopted steel guns have had recourse to the trade (except England). Working in steel appears to be too delicate an operation for military foundries.

England, with all her industrial resources, yet deems the work can be better and more cheaply executed at Woolwich.

It appears therefore, generally, that countries only appeal to private industry for guns, when they cannot rely on their own military workshops.

Forges.—Some great powers cast a part or the whole of their projectiles in their foundries, *e. g.* England. Generally, the raw material is drawn from the trade.

Laboratories are everywhere military.

Powder Factories nearly everywhere military with civil workmen generally. But Belgium draws all from the trade and England a part.

Arsenals.—All have arsenals of construction. The countries the most developed possess them as well as the most backward. The necessity must be admitted by all, and the state interests are best served by conducting arsenals herself and doing away with intermediate agencies.

With regard to companies of artificers, it appears that opinions are divided as to keeping them up in time of peace, and this divergence is probably based on the different conditions of different countries.

Lastly, the vital necessity for the employment of machine power is everywhere shown, and the more this is the case the more concentrated do the military factories become, as at Woolwich, Spandau, Vienna, St. Petersburg, Briansk and Kiew.

IV.

SOME SUGGESTIONS WITH REGARD TO THE ORGANIZATION, INTERIOR ECONOMY, &c., OF NATIVE INFANTRY REGIMENTS.

To all officers, who have served for any time on the staff of Native Infantry regiments, some ideas for the improvement of their organization, and interior economy have probably occurred. The following suggestions, the result of some reflection, are put forth in the hope that some of them may be found worthy of consideration and possibly of adoption.

1. That orderly rooms be provided at the expense of the state in all Native Infantry lines, as they are in those of all European corps.

The want of the above accommodation is a 'serious inconvenience. If orderly rooms are required in British regiments, they are surely no less necessary in native; a commanding officer is now compelled to have prisoners brought before him at his private residence or at that of the Adjutant. Moreover for the transaction of the current regimental business, and for the preservation of the various books and records, a building of this description is much needed. The existence of the old Sergeant Majors' and Quartermaster-Sergeants' bungalows in many Native Infantry lines affords, when this is the case, a ready means of supplying the want which has been pointed out.

2. That an orderly room clerk should be allowed on the establishment of each regiment, and the employment of two, or if necessary three men from the ranks as clerks to the Wing Officers and Quartermaster authorized.

Many officers who have commanded wings, or held the appointments of Adjutant or Quartermaster, know by experience the inconvenience caused when writers or clerks suddenly leave their situations, or refuse perhaps to accompany their regiments to a new station, or only agree to do so, on being promised an increase of pay. This annoyance would be prevented, and a more efficient performance of the needful clerical labour secured at the same time, if writers were entertained in regiments as non-combatants, in the same way as moonshees now are. The following proposal would however perhaps be preferable. In such regiments as choose to try the experiment, let the appointment of orderly room clerk, with rank of Sergeant, and staff pay of say Rs. 15 a month, (to be charged to the Adjutant's office allowance,) be promised to the first man who can qualify for it. In some regiments men who can read and write English, more or less readily, can be found; and if inducements were offered they and others would be led to improve themselves by further study for which they have now every facility. Some of these men would make excellent clerks, and the best of them might be selected and appointed orderly room clerk on probation, but being still required to perform a part, at least, of his ordinary duty. After undergoing satisfac-

torily, say a year's trial, he might be confirmed in the appointment, and promoted on the first vacancy to Havildar. Arrived at this position he would however be required to devote his whole time to his office duties. After a service of say five years as orderly room clerk, this non-commissioned officer might, if he wished to qualify for promotion to native officer, be allowed the option of returning to his duty as a Havildar. It is of course to be understood that for misconduct, or inefficiency, he would be liable to be remanded to his duty at any time, in the rank he held when on probation. The clerks employed by the Wing Officers and Quartermaster need not be taken off duty except at the end and beginning of the month, and their remuneration could be privately arranged. The prospect of promotion to orderly room clerk, when the appointment fell vacant, being held out as a reward to the most deserving would no doubt act beneficially. As a knowledge of English spreads, it is to be hoped, that in a few years, ability to make out in English the muster rolls, etc. of their companies may be considered a necessary qualification for the appointment of Pay Havildar, or Sergeant, when wing writers would be no longer required.

3. The Drill Havildar to be termed Havildar Major. As this non-commissioned officer is required to perform the duties of Sergeant Major on parade, the change of designation is proposed as more appropriate. He should in this case of course be considered senior to all the other Havildars.

4. The Tindal to be replaced by a Quartermaster Havildar on a staff salary of Rs. 4-8 a month.

A smart man could always be selected from the Havildars for this post, whereas a good Tindal cannot so easily be obtained or replaced. Besides, the duties seem of sufficient importance to be performed by a non-commissioned officer.

5. A Musketry Havildar to be appointed on a staff salary of Rs. 4-8 a month.

This non-commissioned officer would of course be employed exclusively in the duties connected with the Musketry training of the regiment.

6. The abolition of the antiquated terms Havildar, Naick, and Sepoy, and the substitution of their English equivalents.

It is not intended that the appointments proposed in Nos. 2, 4 and 5 should entail an increase in the present establishment of regiments. They would of course reduce the effective strength of Havildars, but it is easy, if necessary, to appoint Lance Havildars if more of this rank are required for duty. Neither would any additional expense be incurred—the staff salary of the orderly room clerk being charged to the Adjutant, and those of the Quartermaster Havildar and Musketry Havildar met by the pay of the Tindal which would be saved. Both these latter non-commissioned officers after, say five years tenure of their appoint-

ments, might be required to return to their ordinary duty in order to qualify for promotion.

7. The details of the Musketry Instruction of regiments to be placed in the hands of one officer.

This officer might (1) undertake the entire musketry training of the recruits, (2) assist both Wing Officers, (3) be responsible that the target and judging distance practices are conducted with uniformity by the several companies—a duty which Wing Officers cannot perform as their supervision is limited to their own wings, (4) prepare all regimental musketry returns, and conduct under the commanding officer's orders, all correspondence on musketry subjects. One of the Wing Subalterns might undertake these duties, with advantage to himself as well as to the regiment, being when necessary excused all other duties.

G. J. SKINNER, *Captain,*

Adjutant, 3rd Native Infantry.

V.

THE DOGRAS.

Notes by Lieutenant Colonel J. J. H. Gordon, Commanding 29th Punjab Native Infantry.

THE Dogras are natives of the hilly country lying along the base of the snowy Himalayas, and extending from the Sutlej in the south to the Chenab in the north. The term is derived from "dogur," a mountain, or hill, a word peculiar to the Deccan,—in Hindi "dongur."

Derivation of the term. The dogur, or mountain circle, was the name given to the Jumoo cluster of principalities, which comprise the more mountainous districts. "Dogra" has become a general term for natives of the hills, included within the above general confines.

These hill regions consist of a series of parallel ranges divided by longitudinal valleys, which increase gradually in elevation as they recede from the plains and approach the snowy barrier which forms the northern boundary. Every zone of climate and variety of vegetation is here to be met with, from the scorching heat and exuberant growth of the Tropics, to barren heights destitute of verdure and capped with perpetual snow.

Aspect of the country. The district of Kot Kangra, to which the great majority of the Dogras in our service belong, is in every respect the most important part of this country. It comprises all the hill territory belonging to the British Government situated between the Ravee and the Sutlej. Kangra proper is a long irregular tract of country running north-west and south-east. Its extreme length is 108 miles, and the average breadth about 30 miles.

The entire superficial contents are 2,700 square miles. On three sides it is bounded by native states. On the west flows the river Ravee, which separates the district from the territory of Jumoo. On the north a stupendous range of mountains, culminating to a height of 16,000 feet above the sea level, separates Kangra from the hill principality of Chumba. Its plateaux and valleys, for beauty, exuberant fertility, and capacity, stand unrivalled. The late Mr. Barnes, Commissioner, in describing it says—"I know no spot in the Himalaya, which for beauty and grandeur can compete with the Kangra valley, and those overshadowing hills. Below lies the plain covered with the richest cultivation, irrigated by streams which descend from perennial snows, interspersed with homesteads buried in the midst of groves and fruit trees. The lower hills appear by comparison like ripples on the surface of the sea, and the eye rests uninterrupted on a chain of mountains

Beauty of the Kangra valley.

which attain an absolute elevation of 13,000 feet above the valleys spread out at their base." The

Upper Kangra valleys.

same writer says regarding the upper valleys—"Though on a smaller scale, they are distinguished by the same picturesque position and exuberant fertility, which characterize the lower portions. Trees and plants of opposite zones are here intermingled, and alpine vegetation contends for pre-eminence with the growth of the Tropics. The bamboo, the peepul, and the mango attain a luxuriance

Crops.

not excelled in Bengal; while firs and dwarf oaks, the cherry, the barberry and the dog-rose flourish in their immediate vicinity. Among cereal productions, rice and maize alternate with wheat, linseed, and barley; and three-fifths of the soil yield double crops in the year." Even high up among the mountains, which show a bleak and barren aspect, are secluded glades and hollows, where the cottages nestle under the hill side, and the corn grows luxuriantly protected from the winds

Cultivation.

that desolate the heights above. Cultivation could hardly be pushed further. There is scarcely a single arable spot which is not tenanted. Considering that two-thirds of the area are occupied by unculturable

Density of population.

hills, forests, &c., the population is great, for Kangra is more densely inhabited on the statute mile than the upper portion of the Ganges valley.

Very distinguishing characteristics of this district are the number

Predominance of Agriculturists and Hindoos.

of Hindoos, and the predominance of agriculturists. It is more agricultural and more essentially Hindu than any other equal tract of country. The proportion of agriculturists is three-fourths of the entire population; and the Hindoos rise to 93, while the Mahomedans reach only 7 per cent. of the mass.

Such are the prominent features of this interesting region.

From time immemorial these hills have been inhabited by Hindoo

Antiquity of Kangra Principality.

of their native kings; amongst these petty states, the first, the oldest, and the most extensive was Kangra. It is a popular saying that between the Sutlej and the Chenab there are twenty-two principalities, eleven on one and eleven on the other side of the Ravee; amongst one assemblage of kings, Kangra is the acknowledged head, as Jumoo is considered paramount among the dominions across the river.

According to the local legend, the Kutoch family, as the house of Kangra is designated, is not of human origin. The first Rajah sprang to life in full proportions, created from the perspiration off the brow of the Goddess enshrined at Kangra. His name was "Bhoom Chund," the

progenitor of a line of 500 kings, whose names are recorded in elaborate lists. The ancient name of his kingdom was "Trigurt."

There is no reason to question the extreme antiquity of the Kutoch monarchy. The "mountain kings," on the north of the Punjab, are referred to by the Greek historians of Alexander's expedition more than 300 years before the Christian era; and Ferishta, an ancient Indian historian, narrating the exploits of a former king of Kunoaj, who over-ran the hills from Kumaon to Cashmere, nearly 1900 years ago, subduing 500 petty chiefs, distinctly alludes to the Raja of Nuggurkote, or "Kot Kangra." The ancient origin of the family is still further corroborated by the number of its branches, and the extent of country over which it has spread throughout the lower hills; from the Sutlej to the Ravee, there is scarcely a class of any mark that does not trace its pedigree to the Kutoch stock.

About 600 years ago "Golier," as the Hurreepoor country is called, became a separate jurisdiction under peculiar circumstances. Hurreechund, the Raja of Kangra, while out hunting in the neighbourhood of Golier, fell into a well unobserved by his companions. Fully believing that the king had fallen a victim to some beast of prey, he was mourned as one who was dead, the funeral rites performed, and his brother Kurumchund ascended the throne. Meanwhile Hurreechund was still alive; after a lapse of several days (the legend says 22) some shepherds discovered him and extricated him. He had been mourned as dead; another ruled in his stead; so he resolved not to attempt the recovery of his birthright, but built the town and fort of Hurreepoor, called after himself on the Bungunga, opposite the district capital of Golier; and thenceforward the head quarters of a separate principality. To this day Golier takes precedence of Kangra. Golier is the senior branch, the head of the house by unanimous consent.

Some time after the campaign of Alexander against Porus, it is said that large volunteer armies flocked into the Punjab from Rajpootana. The emigrants fraternised with the early settlers, and introduced then the art of agriculture, and the use of wells for irrigation. In 250 years after their arrival the whole country, from Lahore to Mooltan, from Kusoor to Sealkote, was cleared of jungle. In the Sealkote, district bordering the hills in the present day, there are the Munhas, who are a royal clan, from their having a common pedigree with the Jumoo Princes, and the Bujooos, who give their name to Bujwant. Connection of the Jumoo clan with the Jats. Both of these clans are now essentially Rajpoot in name and association,

but have a common pedigree with "Jat" clans, which shows the prevalence of the Rajpoot origin.

The Jumoo principalities were no doubt established by these Rajpoot emigrant warriors, and the Decani name of Dogur given to the mountainous districts, to distinguish them from those of the plains held by their countrymen. In point of lineage the Jumoo clan is not considered the equal of the Kutoch or Kangra house.

Mamood of Ghuznee in 1009 A.D. conquered and plundered Kangra, and from that time to 1764, these Mahomedan conquest. hill states were generally under

the subjection of the Mogul and Cabul emperors, but on the whole the Hindoo princes appear to have been liberally treated and left as they were found. They built forts, made war upon each other, and wielded the functions of petty sovereigns as they had done prior to the Mahomedan ascendancy, for they seem to have exercised absolute power independent of allegiance to any paramount sovereign. The simple loyalty of the Hill Rajahs appears to have won the favor and confidence of their Moslem superiors, for they were frequently deputed on hazardous expeditions, and appointed to places of high trust in the service of the empire. In the time of Shah Jehan (1646 A. D.) the Raja of Noorpoor, Jugut Chund, at the head of 14,000 Rajpoots raised in his country,

Services to the Mogul empire by hill Chiefs. conducted a most difficult but successful enterprise against the Uzbek of Balkh and Badakshan. Elphinstone particularly records the noble example of the Rajah, who shared the labors and privations of the meanest soldier, and bore up firmly against the tempests of that frozen region, as against the fierce and repeated attacks of the enemy.

In 1661 A. D. the Rajah Mundata, grandson of the gallant Jugut Chund, was deputed by Aurungzebe to the charge of Bameean and Ghorbund, on the western frontier of the Mogul Empire, and 20 years later he was a second time appointed to this honorable post.

On the rise of the Sikh power in 1764, after the expulsion of the Mahomedans the Hill chiefs resumed their ancient dominions, and the hereditary Kutoch chief, Rajah

Sunsar Chund of Kangra, having obtained possession of the Fort of Kangra, became the paramount sovereign of the hills and revived that local tradition which placed Kangra at the head of the eleven Jullundur principalities. For twenty years he reigned supreme throughout these hills, levied tribute from all the surrounding chiefs, instituted and obtained from them military service, and raised his name to a height of renown never attained by any ancestor of his race.

In 1805 Sunsar Chund's ambitious rapacity led him to attack the Hill State of Kooloor, half of whose possessions lie on the Kangra side

The Goorkha invasion, 1803. of the Sutlej. Kooloor solicited the aid of the Goorkhas, who, migrating from Nepal, had already overrun the hills between the Gogra and the Sutlej, a distance of 300 miles from their own border. Then commenced that eventful epoch, remembered by the people as the Goorkha invasion. The memory of these disastrous days stands out as a landmark in the annals of the hills. Time is computed with reference to that period, and every misfortune, justly or unjustly, is ascribed to that prolific source of misery and distress.

The enterprising Goorkhas gladly responded to the call, crossed the Sutlej, and signally defeated the Defeat of Sunsar Chund by the Goorkhas. Kangra force in May 1806. For three years the country was harassed and plundered by the opposing forces, and the anarchy which ensued drove the people to flight to Chumba, and the Jullundur Doab. At last the Kangra chief, in desperation invoked the aid of the Sikhs in 1809, who after a long and fierce fight forced the Goorkhas to retire across the Sutlej.

The Sikhs under Runjeet Sing year by year extended their rule in the hills, until 1828, when Subjection by the Sikhs, 1828. they had the whole under subjection.

The Dogras served their Sikh rulers as faithfully and loyally as they had done their former imperial masters; under their Rajahs they joined in the Sikh campaigns on the Indus. They were largely employed in Runjeet Sing's Army, and on more than one occasion when the Sikh soldiers mutinied, guarded the Maharajah and his capital and fought successfully against superior numbers. Many of them rose to distinction and power in the Sikh service, some of them from the humblest ranks. The father of the present Jumoo Chief rose to his position as Governor of Cashmere from the ranks of the army.

After the Sutlej campaign, in March 1846, the hill country between the Sutlej and the Ravee was ceded the Cession to the British, 1846. by the Sikh Government to the British. The Dogras then freely entered our service, and were as faithful and loyal as they ever have been to those whose rule they accept.

The "Dogur" or Jumoo principalities on the other side of the Ravee, underwent the same vicissitudes. The same epochs marked their history. There were first the Mogul invasions, followed by Rajpoot ascendancy, and final subjection by the Sikhs. On the annexation of the Punjab by the British in 1849, the Cashmere territories were added

Jumoo and Cashmere State, 1849. to those of the Jumoo circle, and the whole formed into a powerful and rich Dogra state under the Maharajah Golab Sing a Rajpoot of the Jumoo clan.

The four Dogra classes, which furnish recruits for our Army, the Bramins, Rajpoots, Rathees, and Girths, comprise upwards of three-fifths of the gross population of the hills.

The Hill Bramins belong almost exclusively to the "Sarsoot" sub-division. Among all Bramins there are two great distinctive classes, viz., those who follow, and those who abstain from agriculture. Those who have never followed the plough, but have restricted themselves to the legitimate pursuits of the caste, are held to be pure Bramins, while those who have once descended to the occupation of husbandry retain indeed the name, but are no longer acknowledged by their brethren, nor held in the same reverence by the people at large. The purer Bramins, who abstain from agriculture, by no means restrict themselves to sacerdotal duties. They will hold land ; they lend money, engage in service, discharge village offices, and will enter on almost any secular pursuit which promises a subsistence.

The Hill Bramin will not associate with the same caste from the Plains. Both profess mutual distrust, and neither will partake of meals cooked by the other. The Hill Bramin eats flesh, which the Bramin of the Plains religiously eschews.

The usual salutation from all classes, the king or the peasant, are "Peir Pounce," (I fall at your feet) or "Muta Tekte," (I touch my forehead in submission.) In returning these courtesies the Bramin says, "Asseer Buhun" to the higher class, such as Rajpoots ; and "Charunjee Kulleao," to the other castes, who are worthy of any recognition at all.

Any member of a royal house, whether belonging to the "Dogur" circle of principalities on the north side of the Ravee, or to the Jullundur circle on the other side, is essentially Rajpoot. They also, with whom they condescend to marry, are included in the honorable category. The name is assumed by many other races in the hills, but by the general feeling of the country, the appellation of Rajpoots is the legitimate right of those royal clans only.

The following is a list of the "Dogur," and Jullunder Chiefs, with the designation of their clans, derived usually from the names of the countries over which they once exercised dominion :—

JULLUNDUR CIRCLE.		DOGUR CIRCLE.	
Country.	Clan.	Country.	Clan.
1 Chumba ...	Chumeeal.	1 Chumba ...	Chumbeeal.
2 Noorpoor ...	Puthaneeal.	2 Bisowlie ...	Billowreea.
3 Goleir ...	Goleria.	3 Bhudoo ...	Bhudwal.
4 Dutarpoor ...	Dudwal.	4 Munkote ...	Munkotcea.
5 Seeba ...	Seebaee.	5 Bindralta ...	Bindral.
6 Juswan ...	Juswal.	6 Jesrowta ...	Jesrowteea.
7 Kangra ...	Kutoch.	7 Samba ...	Sambeeal.
8 Kotlehr ...	Kotlehria.	8 Jumoo ...	Jumoowal.
9 Mundeel ...	Mundeel.	9 Bhotee ...	Bhotee.
10 Sookeit ...	Sooketur.	10 Kishtewar ...	Kishtwaria.
11 Kooloo ...	Kole.	11 Budrawar ...	Budrawaria.

Chumba ranks in both groups as the Ravee divides the territory. The Noorpoor family are called Puthaneas, from Puthankote, their first possession on emigration to this country from Hindostan; the Dutarpoor Dudwals from Dada, a fort on the Beas; the Billowreeas from Bilowur, a term promiscuously used with Bisowlie; and Kutoch, the clan name of the Kangra house, is taken from the ancient principality.

The descendants of all these noble houses are distinguished by the honorary title of "Meeans;" when accosted by their inferiors they receive the peculiar salutation of "Jye Dya," (victory king, or "the king for ever.") Amongst themselves the same salutation is interchanged, and as there are endless gradations among the Meeans, the inferior first repeats the salutation and the courtesy is usually returned; the deprivation of this salutation for offences against caste rules is tantamount to excommunication.

A Meean, to preserve his name and honor unsullied, must scrupulously observe four fundamental maxims. First, he must never drive the plough; second, he must never give his daughter in marriage to an inferior nor marry himself much below his rank; third, he must never accept money in exchange for the betrothal of his daughter; and fourth, his female household must observe strict seclusion.

The prejudice against the plough is perhaps the most inveterate of all; that step can never be recalled. The offender at once

loses the privileged salutation; he is reduced to the second grade of Rajpoots; no Meean will marry his daughter, and he must go a step lower in the social scale to get a wife for himself. In every occupa-

tion of life he is made to feel his degraded position. In meetings of the tribe and at marriages the Rajpoots, undefiled by the plough, will refuse to sit at meals with the "Hul Bah," or plough driver, as he is contemptuously styled; and many, to avoid the indignity of exclusion, never, appear at public assemblies. The probable reason of this prejudice against agriculture, which is as old as the Hindoo religion, is that the legitimate weapon of the Chutrea, or military class, is the sword; the plough is the insignia of a lower walk in life; and the exchange of a noble for a ruder profession is equal to a renunciation of the privileges of caste.

The giving one's daughter to an inferior in caste is scarcely a more pardonable offence than agricul-

Strict seclusion of females.

ture. The seclusion of the women is also maintained with severe strictness. The dwellings of the Rajpoots can always be recognised. The houses are placed in isolated positions either on the crest of a hill, which commands approaches on all sides, or on the verge of a wood sedulously preserved to form an impenetrable screen. In front of their dwellings, about 50 yards from the house, stands the "Mundee," or vestibule, beyond which no one unconnected with the household can venture to intrude. A privileged stranger, who has business with the master of the house, may by favor occupy the vestibule—only those of decent caste and respectable character are allowed to come as far as the Mundee.

Next to the royal clans in social importance are those races with

Rajpoot tribes of the second grade.

whom they are connected by marriage; the honor draws them within the circle. It is not easy to indicate the line which separates the Rajpoot from the class immediately below him, the Rathee. The Meean would restrict the term Rajpoot to those of royal descent; the Rathee would make a broader definition and include himself. But no doubt those only are entitled to rank as Rajpoots, who are themselves the members of a royal clan, or are connected in marriage with them such as the "Munhas," "Jureal," "Souklas." Another class of Rajpoots who enjoy great distinction in the hills, are the Ranas, descendants of former ancient petty chiefs prior to the Rajahs even, whose holdings became absorbed in the larger principalities. Still the name of Rana is retained and their alliance is eagerly desired by the Meeans.

All these tribes select secluded spots for their dwellings, immure their women, are very particular

Customs.

with whom they marry or betroth in marriage, but have generally taken to agriculture. In this last consists their chief distinction from the Meeans.

The Rathees and the Girths constitute the two great agricultural classes in the hills. In all level

Rathees and Girths. and irrigated tracts, wherever the soil is fertile, the "Girths" abound; while in the poorer uplands, where the crops are scanty and cultivation demands severe labor, Rathees abound. It is as rare to find a Rathee in the valleys as it is to meet a Girth in the more secluded hills. The more refined castes preferred the advantages of privacy and seclusion. The effect of the different localities is impressed upon the inhabitants. Rathees generally are a robust and handsome race; their features are regular; the color usually fair; and their limbs athletic. The Girth is dark and coarse featured; his body stunted; and goitre is very prevalent among his race. The men have little or no hair on their faces, which somewhat resemble the Tartar physiognomy.

The Rathees are careful agriculturists. Their women take little or no part in field labors. They

Rathees' sects. are apparently an amalgamation of the Chutrunga and Soodra castes; their ranks are being constantly increased by defections from the Rajpoots. The offspring of a Rajpoot father by a Soodra mother would be styled and accepted as a Rathee. Their sects are as numerous as the villages they inhabit: their higher sects are generally styled Thakoors, who are affronted if they are called Rathees, though they do not affect to be Rajpoots. The best Thakoors families give their daughters in marriage to the least eligible of the Rajpoots, and thus an affinity is established between these two great tribes.

The Rathees generally assume the thread of caste; they avoid wine, and are very frugal in their

Customs. habits. They take money for their daughters or exchange them. Their manners are simple and quiet; they are devoted to agriculture; and make good, manly and loyal soldiers.

The Girths belong to the Soodra division of Hindoos. They are a hard working race. Their women

Girths. work in the fields and carry wood and produce to the markets for sale. Their fertile lands yield double crops and they are incessantly employed during the whole year at agriculture. They are addicted to spirituous drinks, but still thrifty. They are not so manly as the Rathees. Being Soodras they do not wear the "Juneo" or thread of caste. They take money for their daughters but seldom exchange them.

The houses of the peasantry are not aggregated together in villages, but are interspersed over the fields.

Houses. They are constructed of dried bricks, generally with a double roof. The lower story is used for the family, and lumber and the grain of last harvest are stored in the upper; in the wet weather it is frequently used to cook meals in. During the

rains many sleep in the upper story. The upper roof is always of thatch, thick, and neatly trimmed. The outside of the house is plastered with some light or red colored earth, and the front space is kept clean and fresh; the whole enclosed by a hedge of trees or thorns for privacy.

The woods of the "Siree," "Hur," "Behra," and "Peepul" are

Villages.

never used on superstitions grounds. The "Siree" is reserved exclusively for the dwellings of the Rajahs or Gods. No ordinary person must apply the wood to his own purposes. The Bramins and Rajpoots always occupy the most secluded and highest spots of the area of the community. It would not be tolerated for a man of low caste to raise his dwelling on any eminence, which overlooks the cottages of those of higher birth. Every year at "Nooratee" or September, the exterior and interior walls of the cottages are re-plastered.

The interior of the house is furnished very simply. There are the

Interior of houses.

complete sets of all the necessary vessels for cooking, holding water, and for meals, in brass or copper, according to the prevailing custom. In winter the women plait mats of rice straw, "Bindree," for the floor, and construct a sort of matrass, the outside stuffed with old clothes called a "Khinda," and used either as a counterpane to pull over the body, or as a matrass.

With the bulk of the people the food consists chiefly of grain and

Food.

vegetables; meat is a luxury; few can afford to have it, except on days of rejoicing, when a sheep or goat is killed and distributed. Where fish can be got it forms a constituent part of their food. Maize is a favorite grain, and from September to May is in constant consumption; for the remainder of the year wheat meal. In the rice growing valleys the people for the greater part of the year subsist on rice. The agricultural classes have three meals a day. Before going to morning

Meals.

work, the husbandman partakes of some bread reserved from the evening meal, called "Naoharee" or "Dhutyaloo." At twelve o'clock he has a full meal with all his household. In the evening there is a supper, in which however rice seldom appears. Linseed and rape oil are also used instead of ghee by the poorer classes, but most families can afford ghee. The cooking is done by the females of the poorer classes, and by Bramin attendants in the richer houses, but the women of the house always eat separately from the men.

Tobacco is a very favorite drug. Men and women are all addicted

Tobacco.

to it. There is a prejudice against onions and carrots, which no Dogra Rajpoot will eat, but they use garlic. Turmeric is in large request. It is seldom absent from any meal in the household of those who can afford it. The Girths and all Soodras are great consumers of spirits and

wine. No other class will openly acknowledge its use, though many drink secretly.

The ordinary dress of the poorer class is a skull cap, a "koortee"

Dress.

or frock, and a "kach" or breeches, with a "putoo" or blanket, which

in summer is twisted round the head as a turban for protection from the sun, and in winter worn round the body as the Highlander wears his plaid. The Rajpoots and well-to-do classes are very partial to English chintzes for jackets, turbans of several colors mixed together. They are also very partial to wearing colored vests and scarfs, and ear-rings. In tracts, where thorny brush-wood abounds, and when out on shooting expeditions, soft yellow leather trousers are worn.

Early betrothal is the general custom with all classes; the ceremony

"Kormai," is considered binding.

Betrothal and marriage.

When the marriage is agreed on,

gifts are sent with song and music to the bride. Similar presents are returned to the bridegroom. The Bramins fix upon an auspicious day. The bridegroom, gaily dressed and attended by his relations, sets out in procession ("barat") for the bride's father's house. Great feasting and rejoicings take place on arrival. At night the ceremony takes place. A fire is lighted between the couple, a kerchief unfolded is placed over them; offerings of grain, &c. are thrown on the fire: the family Bramin pronounces a certain formula, and the blessing is given. Another ceremony is for the betrothed pair to walk slowly hand in hand seven times round a sort of Maypole, decked with garlands and lanterns, the priests chaunting from the Shastras, and the women singing songs of the joy of married life. Feasting and rejoicing go on for two or three days more, and then the procession, taking the bride along with them, returns to the bridegroom's house, which for the occasion, is adorned with fresh and gay colored plaster. Marriages are interdicted in the months of Poh, Cheit, Bahdon and Asan, (December, March, August, September) or four months in the year.

The near relatives of the deceased assemble, the body is placed in

a rough wooden bier and burnt.

Funeral ceremonies.

The bones of the jaws and of the

fingers and toes are however collected, and must within four years of date of decease be thrown into the sacred Ganges river. But if they can be deposited in the Ganges within the twelve mourning days, it is thought to be a great blessing. For twelve days the house mourns; friends come to console; the men shave their heads; the women put off their jewellery; no music or singing takes place. On the thirteenth day the Bramins purify the house, and a feast closes the proceedings. Like all Hindoos they always are placed on the ground to die.

When a boy is born the family Bramin at once casts his horoscope

and names him. The father gives

Births.

a feast to the Bramins and to his

assembled relatives. These rejoicings sometimes last two or more days. When a girl is born, the rites are the same but there is no feasting or rejoicing. On the thirteenth day after birth the family Bramin comes and purifies the house, by the sprinkling of the sacred Ganges water and reading the Shastras.

In general physiognomy the hill people are decidedly a good looking race. Their complexion is fair, owing to the temperate climate ;

their features well formed ; in stature they seldom exceed the middle size ; for vigour and manly strength they are not equal to the Sikh or Jat inhabitants of the Punjab. The caste gradations are strongly marked in their aspect ; the higher the caste, the more pure and elevated the features. Among the Bramins and Rajpoots are generally to be found these distinguishing marks of long descent. The agricultural races are less refined and attractive in appearance.

Their chief amusements are throwing the log, single stick, fighting (with short wooden sword and shield), hawking, netting game

and shooting. They have no particular national arms. They are generally considered to be good shots.

Their nature is obedient and tractable ; they have no aspirations after independence. They seem to far prefer being under authority

and yield implicitly to an influence which they admire and respect. Their disposition was formed to obey and to be dependant. They are very superstitious, easily misled, and distrustful of strangers. They will not set out on the most common expedition, nor undertake any duty without first consulting a Bramin. Saturdays and Wednesdays are propitious days for going south ; Thursdays for the north ; Sundays and Tuesdays to the east, and so on.

The fourth and eighth days of the moon are full of disaster ; no one would willingly infringe these rules. They are very strict in their religious observances, and the priestly class have a deeper influence than in other parts of India. Almost every house possesses its Penates, in a "Sidh" or "Nag," to repel witches and propitiate fortune.

They are very susceptible to kindness or the reverse. To be assailed with abuse is not to be forgotten, and frequently leads to suicide.

They are exceedingly attached to their native hills, and when away save money steadily in order to return to their homes.

Their fidelity is well understood in the Punjab ; and the Maharajah Runjeet Sing, and many of his chief Sirdars, showed their appre-

Fidelity to Sikh rulers.

ciation of this quality by employing hill men in the most responsible situations about their persons.

As soldiers they are not remarkable for daring or impetuous bravery, but they are valuable for quiet, unflinching courage, patient endurance of fatigue, and for orderly and well conducted habits.

They prefer cooking their own food separately, but, in cases of necessity when on duty, will take their food cooked by the regimental Bramin cooks. They are very particular about their drinking water. Kuhars do the work of water-carriers in Dogra companies. These men carry drinking water in large brass vessels banghy fashion.

The Dogra is notwithstanding a good soldier, and, when engaged in active service or other extraordinary occasions, will for the time lay aside most of his punctilious caste prejudices and adapt himself to the circumstances of his position. They will then carry their water in mussuks, drink out of them, and avail themselves largely of the services of their cooks. This they seem to do the more readily if they are kept together in companies by themselves.

Dogras are much employed in the Punjab Frontier Force, and 12 Infantry regiments of the Bengal Army have each a proportion of an eighth or so of that class. Half of the regiments of Bengal Cavalry have also a proportion of Dogras in them. Such good authorities as Major General S. Browne, and Brigadier General Sir C. Brownlow, who have seen much of Dogras on service, have a high opinion of their qualifications as soldiers ; more especially for that important kind of warfare, in which we are so often engaged in India, viz., hill campaigns.

The Recruiting Districts of the Dogras are Sealkote, Goordaspoor, Hoshiarpoor, as well as Kangra.

Note.—I have given a short account of the early and modern history of the Dogras, and of the aspect, &c. of their country, considering that the reader will thereby be enabled more fully to understand their characteristics, and their qualifications for our military service. Most of my information has been derived from Barnes and Priusep's Settlement Reports of the Kangra and Sealkote districts ; the remainder by personal enquiry among Dogras.

J. J. H. GORDON, *Lieut.-Colonel,*
Commandant, 29th Punjab Regt. N. I.

P. S.—It may not be out of place here to mention, that in the China campaign of 1860, a considerable number of Dogra Rajpoots

served in several of the Punjab regiments there employed, whose caste prejudices were never heard of, and who invariably drank out of goat skin mashucks.

Peshawur, 13th November 1873.

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H. H. STANSFELD, LIEUT.-COLONEL,

Secretary.

ORIGINAL PAPERS.

I.

HISTORICAL MEMOIR OF THE DISMOUNTED SERVICE OF CAVALRY,

BY LIEUT. G. H. ELLIOTT, 3RD BENGAL CAVALRY.

"There is nothing new under the sun," so runs the old proverb, and the truth of this saying is exemplified, when we come to enquire into the history and achievements of that class of soldiers, now known as Mounted Infantry, or Mounted Rifles.

Since the American War in 1863-64, when such startling feats, and wonderful raids, were executed by the cavalry on both sides under the guidance of partizan leaders like Stuart, Sheridan, Morgan and Stoneman, the question of having a number of men, trained to fight both on horseback and on foot, is one that has engaged the earnest attention of many able soldiers, high in authority and in position, whose experience in the field and theoretical knowledge, qualifies them to give an opinion on the much vexed question, whether or not, mounted infantry should form a part of every modern army. However as is usual in these disputed cases no decided action has as yet been taken towards a final settlement of the matter. It is true that since the introduction of breech loading carbines, the mounted soldiers of many services have been trained to a certain extent to fight on foot, more especially in the Russian cavalry, where the true Dragoon now forms a part of their vast army. But notwithstanding this latter example, and all that has been written and said on the subject, to this date the value or otherwise of mounted infantry remains to a certain extent a disputed point, nor does there seem at present any likelihood of a definite conclusion being arrived at, when we come to consider the storm of hostile criticism, that has been evoked by Colonel Chesney's recent proposal to raise a force of 30,000 mounted riflemen.

Under these circumstances, an historical sketch of the organisation and achievements since the earliest times of the class of soldiers now under discussion, may be of some small value to those who are interested in the matter, for previous history often enables us to judge rightly of the merits or demerits of any particular subject we are desirous of enquiring into. We trust then that the

following information, compiled from various sources, may be of some use to the military student. It will be seen in the course of this enquiry that to speak accurately, it is rather the history of the dismounted service of cavalry, than the mounted service of infantry, with which we have to deal, and it will be also interesting to trace the changes which have taken place gradually, since the Greeks and Romans in ancient days, formed a class of soldiers for service on foot as well as on horseback.

The earliest record we possess of the horse being used by soldiers as a means of rapid locomotion, is made by Josephus in his "Antiquities of the Jews." He informs us that when the Hebrews under the conduct of Moses left Egypt (B. C. 1491), they were pursued by Pharoah, with an army of 250,000 men and 600 chariots. These chariots were told were simple in their structure, open at the back and partly on the sides, and were drawn by three horses harnessed abreast. Each chariot contained the charioteer and his shield bearer, who protected him whilst he drove, from the darts and javelins of the enemy, also a heavily armed bowman who stood on a platform usually somewhat raised. The vehicles were rarely brought into collision with each other, but were driven rapidly over the field, the warriors hurling javelins on either side, or when occasion presented itself, alighting to fight on foot. These soldiers might certainly be called mounted infantry, as they used their chariots to convey themselves quickly from place to place, and then fought on foot. In later times the chariot was much used for warlike purposes. "And Solomon had 40,000 stalls of horses for his chariots, and 12,000 horsemen." (1 Kings iv, 26.) Caesar also relates that Cassibelaunus after dismissing his other forces, retained 4000 war chariots about his person. It will be seen therefore that instances are not wanting in history, to prove that the ancients were acquainted with the value of being able to transport fighting men quickly from place to place.

The first mention however of soldiers who were actually trained to fight both mounted and on foot, is made by Xenophon, who states that Alexander the Great instituted a levy for this purpose (*dimachæ*). These men were mercenaries, armed with javelins or arrows; they wore no defensive armour and in common with the rest of the Greek cavalry used no saddles or stirrups. A bow and a short cutting sword with a small shield completed their armament. They formed part of the 5,000 horse, that early in 334 B. C., helped to defeat the Persians under Darius at the battle of the Granicus. In this action the infantry kept pace, and engaged the enemy at the same time and together with the horsemen. The victors lost but fifty-five foot soldiers, and sixty horse, although the number of combatants engaged on both sides amounted to 655,000. After this victory Alexander having gained experience from the enemy, and being in a country (Asia Minor) where fine horses were procurable, largely increased his cavalry, and this arm in no small degree contributed to his subsequent success at Issus and Arbela.

The Romans like the Greeks, also had cavalry (velites), who served both mounted and on foot ; they had no saddles, but their horses wore leather housings, sometimes strengthened with iron scales or plates. The lances and javelins of the Romans were shorter than those of the Greeks, but in other respects they were similarly organized and equipped. It may be here remarked that the Romans never properly appreciated the value of mounted soldiers until the second Punic War, 218 B. C., when Hannibal with the aid of his Numidian, Gallic and Spanish cavalry defeated them in the battles fought at Trebia, Ticinus, and Cannoe. In after days during the decline of the empire taught by bitter experience, the Romans gladly availed themselves of the services of the Gallic cavalry ; and Gauls, enlisted into their army formed the greater portion of the cavalry, at the time when the citizens of Rome almost without exception served only in the Praetorian guard.

When the barbarians overran the Roman Empire, the amalgamated Franks and Gauls became most excellent horse soldiers, and rapidly effected improvements in their arms and appointments. The invention of saddles and stirrups about this period added much to their efficiency and comfort ; but no further improvement in the organization or training of cavalry in any very marked degree, seems to have taken place until A. D. 932, when Henry I, King of Germany, surnamed the Fowler re-organized and trained his cavalry as light horsemen. Armed with cross-bows, and taught to work on foot as well as mounted, they contended successfully, in many well fought fields, against the Huns, Danes, Vandals and Bohemians, who at that time were greatly and justly dreaded throughout Europe.

Having thus briefly traced the history of ancient cavalry, as far as it bears on the subject under discussion, it is necessary to investigate the Military system of the middle Ages, and enquire whether any remarkable alteration in the tactics or organization of mounted soldiers took place, at the same time as the Feudal system came into general operation.

The invention of gunpowder and its adaptation to military purposes led to a complete change in the formation and equipment of military bodies, and although at first sight the assertion may seem strange, it is yet perfectly true, that the introduction of the cuirass as defensive armour had precisely a similar effect although the change was not quite so marked. The cuirass originally made of leather strengthened with iron plates, was converted by degrees into the suit of complete plate armour as worn by knights and men at arms in the fifteenth century. About this period cavalry tactics seem to have had no place in the art of war. A cavalry fight was a collection of duels, no manœuvres were attempted, each knight rushed on his vis-a-vis, and personal courage, or brute force in place of tactics and science, decided the battle. Finally, so great was the security against wounds afforded by the defensive armour of the period, that warfare became extremely inoffensive. Thus at the battle of Zagonora in 1423, only three persons lost their lives, and those by

suffocation in the mud. At that of Molinella in 1467, not one was killed; and when Henry the First fought the battle of Brenville in Normandy, he had but three persons killed. Truly a great difference between these encounters, and the battle of Issus, where the Persians are reported to have lost 110,000 men on the field.

However this great weight of armour, notwithstanding the security it afforded, was not without its advantages. We read that—"It rendered the heat of southern climates insupportable, and in some cases increased the danger of death, as in the passage of a river or morass. It was impossible to compel an enemy to fight, because the smallest intrenchment or natural obstacle could stop such unweildy assailants, but in order to obviate some of its military inconveniences it became usual for the cavalry to dismount, and leaving their horses at a distance to fight on foot with the lance."

A notable instance of this custom, attended with very disastrous results, is to be found in the history of a battle fought between the Swiss and the Austrians in 1386.

The action took place, upon a narrow and rugged plain, shut in by hills, where the Austrian cavalry, 4000 in number, could have been but of little service. They were consequently dismounted and their horses sent away some distance. At first the Austrians, protected by their cuirasses and armed with long lances, kept the enemy at a distance, but owing to the conspicuous bravery of Arnold Winchelreid, the Swiss only 1300 strong were enabled to pierce the Austrian battalion and utterly rout them. They turned to fly, but, encumbered by their armour, and unable to reach their horses, were completely cut up, and but few survived to tell the tale of their defeat.

It may be here properly remarked, that one of the fundamental rules for dismounted service is, that cavalry should never be dismounted in any position, where the enemy have a chance of defeating them, before they can remount and be ready to meet the attack or retreat. The nearer they are to the led horses the better, as they can more rapidly rally and mount. The neglect of this simple precaution cost the Austrians their lives, and it is to be hoped that with this example before them, modern cavalry may never fall into the same error.

Continuing the enquiry into the history of the cavalry of the Middle Ages, we find that temporary levies of light horsemen were formed from the esquires and vassals who attended the knights and men-at-arms; they were called demi-launces and hobilers, from the small horses or hobbies they were in the habit of riding. Their principal use was to act as foragers, scouts, and vedettes, to protect the camp, and give the heavily armed knights time to accoutre themselves when an engagement was expected. Mounted archers also constituted a portion of the cavalry, and were accustomed to fight both on horseback and on foot, more often the latter.

It has thus been shown that up to this period, from the most ancient times, horse soldiers were frequently trained to fight dismounted, and it will also be seen that the great changes brought about by the invention of gunpowder, and its adaptation to military purposes, did not cause the practice to be discontinued ; on the contrary the true dragoon now makes his appearance on the scene, a species of soldier who according to Dr. Johnson fights indifferently on foot, and on horseback, a definition much at variance with that of a modern authority, who is of opinion that he should fight equally well in both situations.

Having now reached the third stage of the investigation, proposed to be carried out at the beginning of this paper, before proceeding further with the enquiry, it will be well to note the changes in the organization and equipment of military bodies, that were brought about by the invention of portable fire-arms. The first and greatest alteration was the lightening of the whole of the accoutrements of the soldier. The cuirass, shield and helmet which had formerly protected the wearer from the sword and lance, and which to a great extent had rendered warfare so innocuous, were gradually either made lighter or entirely discontinued, it being found that they were no safeguard against bullets unless made enormously thick.

And as the use of fire-arms could only be learnt after a long apprenticeship to the trade of war, the professional and drilled soldier began to constitute a part of every force, in other words standing armies superseded the irregular levies, whose deficiency in drill unfitted them for the manœuvres requisite for execution in the field, with troops who used fire-arms. Standing armies necessitated the institution of regular discipline and barracks ; and from the midst of the chaos into which the art of war had fallen from the fifth to the fifteenth century, by slow and almost imperceptible degrees emerged scientific warfare.

In order thoroughly to understand, and fully appreciate the great changes, that took place at this important epoch, it was perhaps necessary to digress somewhat from the matter in hand, but the discussion of our former topic can now with fitness be resumed.

Shortly after Hussars had been levied by the Hungarian government, Carabineers (Arabic *karab*, a weapon) were first raised by Henry the Second of France, and were originally intended to fight both on horseback and on foot. The Marechal de Brissac formed the first regiment of them for service during the war in Piedmont about 1550. By birth chiefly Gascons, the men were armed with carbines, swords and pistols, and wore the cuirass and helmet. These carabineers were found to be so useful on service, that many other countries organised similar bodies of troops under the name of " musqueteers," " hargobusiers" and " arquebusiers à cheval." The English, Spaniards and Swedes, setting the example in enlisting and training this new class of soldiers, who were continually employed with great effect in the many wars of this and the following century.

A little later on, the Prince of Parma, when he wished to surprise the Duke of Alençon mounted his infantry on pack horses ; and dragoons or dragoniers, so called by the famous Count of Mansfeldt " because mounted on horseback with lighted match he seemeth like a fiery dragon," became a constituted part of every army, and so remained with but little change until Charles the XII of Sweden revolutionised the organisation and tactics of cavalry. The first regiment of dragoons that was raised in England was formed it is said about 1680: Dragoons do not seem to have been handled in the field with much boldness or quickness, for the practice was to mix horse and foot together, sending the cavalry into action supported by bodies of musketeers placed in the intervals ; this to a very great extent deprived them of the advantage to be derived from the speed of their horses, as well as their impulsive power ; but notwithstanding this error on the part of their commanders, dragoons rendered invaluable service in many a well contested battle.

Eastern nations too fully valued the advantages to be gained from moving troops quickly from place to place when in action, for the Turks who at this time indisputably possessed the finest cavalry in Europe, were in the habit, when occasion required, of working dismounted. Sometimes also to gain time the Turks mounted part of their infantry, *en croupe* behind their Spahis, for it is related that " early in the battle of Rymnik, when they had to contend with Marshal Suwarrow and some Austrians, a body of 6000 Janissaries jumped up behind an equal number of Turkish horsemen, and were carried at full speed to occupy a commanding eminence of which the Austrians were also desirous of taking possession." This incident exemplifies one of the truest uses, that mounted infantry can ever hope to be put to, viz. the rapidly taking and keeping temporary possession until relieved or reinforced, of some *decisive tactical point* whether for *offence or defence*, during or prior to an engagement.

A somewhat similar incident to the above, occurred in India after the battle of Budiwall in 1846, during the Sutlej campaign, when a regiment of British infantry was taken out of action, and conveyed to a place of safety by an irregular cavalry corps, the infantry as before having mounted behind the cavalry.

Perhaps the most curious account of dismounted service placed on record, is to be found in the memoirs of Phillipe de Comines; he states that the Stradiots, who were light horsemen from Greece, Albania, and Roumania, at that time serving as mercenaries in the army of France, were in the habit of dismounting and forming close column like pikemen to resist a charge of hostile cavalry. Truly strange tactics, but the Stradiots, famous as scouts, and for harrassing an enemy before an action, and during a retreat, were not capable of standing a charge in line from the heavy dragoons of the period, hence the strange spectacle of dismounted cavalry forming square to receive cavalry.

Passing on to the history of the times of Gustavus Adolphus, and Charles the XII, we find that carabiniers had fallen into disrepute. Dragoons were now taught to charge the enemy sword in hand, and not to trust to their fire arms so much as formerly, their equipment and armament was much altered, and mounted on more powerful horses than formerly, by degrees they were assimilated to the rest of the cavalry, and so remained until Napoleon re-organised the French army in 1805. The following extract from Wraxall's Sketches will explain the condition into which the dragoon had fallen, and the measures that were adopted to restore him to his former high position :—"The dragoons in spite of the brilliant services they had rendered under the old monarchy, had been reduced to a most insignificant condition by the Republic. At one moment resembling heavy cavalry, at another light, changing their chiefs and system daily, combating now on foot and then on horseback, or scattered among the infantry divisions with no other duty to perform than that of clearing the way before action and pursuing the enemy after defeat—the dragoons lost amid these fluctuations both their *esprit-de-corps* and their old reputation. The Army on seeing these men half horsemen and half foot soldiers, with no distinct functions, charging badly because they were badly mounted, going through their infantry drill badly because the cavalry man is neither equipped nor dressed to perform it properly, uttered the words "Sabre de bois!" and the jokes finally demoralized the once brilliant dragoon regiments. But when Hoche had formed at Neuwied distinct brigades of dragoons, and they were at length employed in a manner befitting them, they regained their old place in the esteem of the army, and the number of regiments of this arm was raised eventually to thirty."

Following, it is presumed this example, the Emperor Nicholas of Russia about 1830, formed a large corps of dragoons, some 15,000 strong, but the experiment was not very successful, as so large a body was both out of place, and difficult to handle with sufficient rapidity and ease. If the corps had been rendered more mobile by being broken up into brigades, the experiment perhaps might have succeeded better.

In India we have no record of the true dragoon ever having been employed in the numerous campaigns which have been fought from time to time, but mounted infantry on various occasions have been employed with good effect. Colonel Maxwell in his notice of camel guns, informs us that Sir Charles Napier in the years 1842-43, mounted a company of the 13th Light Infantry on camels, each soldier being seated behind a native camel driver. The infantry man was armed with his musket, and was provided with sixty rounds of ball cartridge. In the mutiny of 1857, and for some time subsequently, two camel corps, on Sir Charles Napier's model, were organized, one company being taken from the Rifle Brigade and another from the 92nd Highlanders. These camel corps were however no novelty, as Napoleon, during his occupation of Egypt 1798-99, employed camel corps to enable him to cope with his fleet antagonists the Arabs. Colonel Maxwell further remarks, that if camel corps could, in addition to their

power of locomotion, be endowed with increased power of musketry fire, their value from a strategical and tactical point of view would be vastly increased. Combined with cavalry, they would be more especially suitable to such operations as reconnaissances, as they would provide the reconnoitering force with precisely the element in which reconnoitring parties are usually deficient, viz. missile power and capacity of resistance in case of surprise ; further, for suddenly seizing important strategic points such as the junction of a number of ordinary roads or railroads, fords, bridges ; or for making requisitions, seizing boats in a river, escorting convoys, and the like. The introduction of a light camel gun, on the Gatling principle, would seem to point to the solution of this problem.

In a similar manner to the camel corps, elephants have been used in India to transport infantry from place to place. At the battle of Calpee in May 1858, the camel corps rendered great assistance, for when the right of our line was hardly pressed, and the artillery were fighting for their guns, the Rifle Brigade was brought up on camels, and this opportune re-inforcement, it is said gave us the victory (Colonel E. Wood). In Europe we find that country carts have been employed for the same purpose, for instance at the action of Tobitschan, in 1866, a company of infantry was attached to the Hussar brigade, and transported in waggons to a ford through the Becwza, which they, held during the day. Again during the late Prusso Franco war, at the siege of Paris, the Prussians sent out divisions of cavalry to scour the district, but they found they could do nothing without infantry, hence a half battalion of Jagers was sent with each division, but as the cavalry found that the infantry kept them back, they put them into carts. This would seem to be another proof of the want of true mounted infantry.

There now remains to notice the cavalry or more properly speaking the mounted rifles, raised on both sides during the American civil war. As the feats they performed, and the wonderful raids they executed, have now been rendered almost historic by late writers on the subject, it is perhaps unnecessary to enter any further into their history or achievements ; it will suffice to say that since 1815, no horsemen have been used with greater effect, or have rendered more signal service than the Federal and Confederate horse during the protracted struggle of 1862-65. One brilliant example of the use of mounted rifles in pressing rear guards during a retreat, may however be given as an illustration of their value for such and other kindred operations. We read in Sir Henry Havelock's book that " General Lee was retreating on Lynchbourg covered by General Ewell's division, 7,000 or 8,000 strong. General Meade was pursuing the Confederates and sent Sheridan on in advance with 10,000 mounted soldiers. Sheridan came on the rear of Ewell's force near Deatonville on Sailors' Creek, and not daring to make a serious attack without infantry, he directed Crook's division to harass the flank and rear of the column, while the other two divisions passed on and eventually headed the Confederates. Ewell's men fought gallantly but they were detained till the 6th Infantry Corps, coming up, crushed

them, and the General and 6000 officers and men surrendered to the Federals whose loss was insignificant. Many other instances of the worth of mounted riflemen, when properly used in their legitimate sphere, might also be given ; but the above will suffice to show how they were employed by such leaders as Sheridan and Stuart. It should however be carefully noted, that these American horsemen were not cavalry in the true sense of the word, as they were incapable at any time of making a charge in line against good infantry ; another proof if such be wanted that cavalry who depend chiefly on their fire arms, will never charge home, like good horsemen trained to the use of sword and lance have done on many a well-fought field. Therefore when praise is given to the Confederate and Federal guerilla horse, for the services they performed, it should be for their prowess as mounted rifles and not as cavalry.

I have thus briefly, but I trust clearly, traced the salient points of the history of the dismounted service of cavalry up to modern times ; and the following inferences may now with fitness be made from this historical *résumé* which has been compiled from many works on the duties and services of mounted soldiers.

In the beginning of the paper it has been shown that the employment of mounted infantry during war is not of recent origin : on the contrary, since the most remote times and in nearly all countries, they have in one form or another been employed with good effect ; and whether known as charioteers, dimachæ, velites, cross-bowmen, knights, hobilers, men-at-arms, mounted archers, carabineers, hargobusiers, arquebusiers à cheval, stradiots, dragoons, camel corps or mounted rifles, each and all have had the same object in view, viz. to combine the rapid locomotion of cavalry with the offensive and defensive missile power of infantry. Not an easy problem perhaps in many ways to solve, but as in these days of scientific warfare more difficult questions are being daily decided, there would seem no reason why some definite conclusion as to the adoption or otherwise of mounted infantry should not speedily be arrived at. Financial reasons may however have precedence of military requirements, in this matter as in most others. Whilst reading the history of dragoons it will be seen that as long as they preserved their original character ; viz. mounted infantry, they succeeded excellently and rendered good service ; but afterwards when they were drilled and treated as regular cavalry, fell into disuse. In short the training they received from 1760 to 1810 rendered them useless both as cavalry and infantry. Rogniat in his "l Art de la Guerre," says—"How absurd is the manner of training our dragoons ; when mounted they are taught that no infantry can resist the impetuosity of their charges ; when drilling on foot they are taught to consider themselves invulnerable against cavalry. It is from this cause that they are despised both by horse and foot." Marmont, Jomini and nearly all military writers of note, agree that it is impossible to train a man to fight equally well on horseback, and on foot. Napoleon apparently was of a different opinion, as he said that 3,000 dragoons were equal to 2,000 infantry.

But few will accept this theory as absolutely correct ; more especially as recent experience, gained during the American war, distinctly shews that cavalry who are expected to *ride over* hostile forces of any description must rarely dismount to fight, or be taught to rely on their fire-arms, instead of the sabre and lance. Furthermore the history of warfare clearly shows that mounted infantry, and cavalry, are two totally distinct arms, which should be differently equipped, and differently employed. Any attempt to make a cavalry man fight on foot, or a mounted infantry soldier fight on horseback, must inevitably be attended with disastrous results, for it is well known that a cavalry soldier dismounted to fight, has a marvellous tendency to fall back and get on his horse again ; while the contrary is the case with an infantry soldier. Mounted temporarily on a horse to give him the power of rapid locomotion, he prefers to dismount and fight on foot being more at home on "terra firma," than in the saddle. In fine it is beyond all doubt that mounted infantry would never have ridden to certain death, like the cavalry who fell in the charges at Balaklava and Rezonville ; and on the other hand, dismounted cavalry would never have taken Badajoz, nor attempted to storm the heights of St. Privat, where 6000 Prussian infantry fell in ten minutes.

Notwithstanding the immense weight of evidence, which goes to prove that mounted infantry, and cavalry, are two entirely distinct auxiliary arms ; some are yet of opinion that their widely different duties might be made interchangeable ; in fact, that cavalry should not only perform their own, but the duties of mounted infantry as well, or vice versa ; a system that if established would lead to a minimum amount of result with a maximum amount of expenditure. The proverb "Jack-of-all-trades and master of none" points out in a very forcible manner the consequences that would result if this plan were ever adopted. It must not be thought however that, cavalry are never to dismount and work on foot, for there are some occasions when they can do so with great advantage, and the general principles of cavalry acting as infantry, are so well laid down in Woinovitch's Austrian Cavalry Exercise, that an extract from that work will not be out of place:

"It is only in *exceptional cases* that cavalry is employed to fight on foot ; on principle it should only occur when there is no infantry at hand, and the object in view cannot be attained without the fire of a dismounted body. The necessity may present itself. For example, should it be required to occupy some distant and important point before it can be reached by the enemy, to maintain it until the infantry can come up, or, when passing from a covered and intersected, to a perfectly open country, to cover the retreat of the infantry. Cavalry may undertake and carry out with its fire, without the co-operation of infantry, sweeping dashes against the enemy's flank and rear, with a view to destroying communications, cutting off reserve establishments, &c., or be employed to cover the action of artillery by occupying points from which the guns might be threatened in flank or rear, or may undertake difficult reconnaissances, foraging expeditions, &c. The fire of cavalry on foot will therefore, generally speaking, be employed in a defensive point of

view ; when the object is attained, or the infantry has come up, the cavalry will at once remount."

Nothing can be more distinct than the above instructions ; and the details of the duties and formations of cavalry fighting on foot, are also extremely well explained in the same book. For our own service, Horse Guards' G. O. No. 33 of 1873, has been published containing " Instructions on dismounted service and attack," the principles of which bear a very close resemblance to those laid down for the Austrian cavalry.

Connected with the subject we are discussing, is the question as to the proper armament of cavalry, and there is but little doubt that horsemen who are armed with the carbine, should receive as good weapon as possible, otherwise they are liable to be much hindered if not altogether stopped, by any small body of infantry who may choose to challenge them. Jomini's maxim must not be forgotten. " Superiority of armament increases the chances of victory in war : it does not of itself gain battles, but it is a great element of success." We are told that in the numerous encounters which took place on the Loire and in Brittany, between detached parties of Prussian cavalry, and French infantry and Franc-tireurs, the former found that until they procured chassepots and used them dismounted, they received constant checks, and also that Franc-tireurs untrained, without discipline, uninured to the hardships of guerilla life, and in most cases unaccustomed to fire-arms, so harassed the German cavalry that it required the aid of infantry to enable them to cross certain tracts of country. In short wherever the Franc-tireur showed himself the ubiquitous Uhlan promptly disappeared. It would seem self-evident therefore, that for cavalry to carry out successfully any of the minor operations of war that fall to their lot, such as out-post duty, advanced and rear guards, artillery, and other escorts, convoys, or reconnaissances, they should be armed with a breech-loading carbine, sighted up to at least 600 yards ; the Prussians apparently acknowledge this to be absolutely necessary, as they are about to arm their cavalry with a much better carbine than that with which they fought during the late war.

Whilst it is universally admitted that cavalry should be armed with the best carbines procurable, at the same time it must be observed, that the annals of war clearly show that they should not be allowed to use them mounted, except perhaps on outpost duty, to give the alarm, &c., when skirmishing, or on other rare occasions when absolutely necessary. Indeed there are many who say that mounted skirmishers are useless, and could be easily replaced by a few scouts judiciously thrown out ; while on the other hand, others think that they serve to keep the enemy's scouts at a distance, and are useful as a signal to show that the men are engaged. Be this as it may, cavalry as a rule, should always dismount to use their fire-arms, a precept laid down for the first time by Frederick the Great, when he re-organised his army after the battle of Mollwitz. He did away with all firing in line, and reaped the advantages of his new tactics in many actions, more especially at the battle of Zorndorf, where

his great cavalry leader Seidlitz overthrew the Russians completely, and routed them with great slaughter. The French on one occasion during the war of 1870, suffered severely from a neglect of the above quoted maxim. At Mars-la-Tour one of their dragoon regiments drew up in line mounted, and commenced firing at a Prussian cavalry corps, who were advancing to the attack, the Prussians nevertheless steadily continued their advance, and before the French could return their carbines, draw swords and move off to meet the foe, were fallen upon by the enemy whilst in confusion, and driven with great loss ignominiously from the field. This is another example of the folly of teaching cavalry to rely on their fire-arms. The French cavalry however on other occasions dismounted, and used their fire-arms to much better purpose ; for we are told that at the battle of Spicheren, two squadrons of a dragoon regiment and a company of engineers were left to guard the outlets from a wood. Under cover of some slight earthworks hastily thrown up by the engineers, the dismounted dragoons opened fire on the heads of the advancing Prussian columns, and having succeeded in checking their advance, remounted to charge the enemy sword in hand, whom they defeated. After this feat of arms they retired behind the line of railway, and with the assistance of the engineers maintained their position long enough to give the troops who occupied Forbach, time to make the dispositions they wished. (Lieut.-Col. Bonie.) The above incidents clearly illustrate when cavalry should use their fire-arms, and when they should not.

Enough has now been said on the history of the subject which we proposed to enquire into at the beginning of the memoir, and having reached this final stage of the investigation, it is far from being my intention to attempt to hazard any conjectures, or to draw any conclusions from the examples and incidents of actual warfare laid before us ; for to dogmatise on military subjects in an arbitrary manner, or to deduce theories from the experience gained from a study of the events of war, must always be difficult and very often unsatisfactory. War is not an exact science, for the conduct of which fixed laws can be determined, or unchangeable rules laid down : hence it has been my object to give an historical *résumé* rather than an argument, leaving it for those who combine theoretical knowledge with experience in the field, to suggest rules for future guidance. Although it is true that the study of war must of necessity remain to a certain extent amongst the inexact sciences still to a very great degree the examination of past events and combinations enables us to solve problems, that would otherwise remain undecided ; and it is beyond all doubt that if theory is properly applied in practice, success is more likely to be attained than by mere practice alone. In short the golden rule that should guide the conduct of the operations of war, both greater and minor, cannot be better or more concisely expressed, than by the ancient words, "*Tam Marte quam Minervâ*"

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3rd Bengal Cavalry.

II.

CAVALRY ARMAMENT—LANCE OR CARBINE OR BOTH.

THE following translation from the German is put forward, not as containing a decision on a question which is full of interest to military men, but as an assistance towards arriving at a just view of the matter. The manner in which the writer has gone into the subject, is a lesson to those, who hastily, adopting an idea, merely search for such arguments as support their own views, and was one of the chief inducements to the translator to make the contents more generally known.

It must be admitted that the question of Cavalry armament is often discussed by us in a most unsatisfactory and piecemeal manner.

The notion that has been gaining ground, of the narrow sphere left to Cavalry in future wars, is here well met ; and the remarks that good Cavalry should carry the declaration of war into an enemy's country, and interfere with the mobilizations and concentration of his armies, opens out a grand vista to the mounted branch of the service.

D. S. WARREN, *Major,*
1-14th Foot.

A WORD ON THE ARMING OF THE UHLANS.

BY AN OFFICER OF UHLANS.

AMONGST the cavalry questions of the present day, the armament of the Uhlans has become one of the most important. In considering it, the opposing principles of past and modern times are called forth—

I. Whether a thorough or partial combination of the lance and carbine is desirable ?

II. Whether the abandonment of one weapon, in favor of the other, has become a necessity ?

These are the questions which force themselves on our consideration.

An honest wish to see the matter thoroughly investigated causes the writer to put forward the following lines extracted from well-known military publications:—

“In the melee, the effectiveness of the lance degenerates into that of a cudgel.”

And again:—

“But seldom will this weapon in the melee maintain its position as the queen of weapons. German sword cuts, delivered by German Cavalry soldiers, will perform their work better.”

These and such like expressions condemn the lance once and for all, and would, without further question, decide in favor of the carbine.

On the other hand, and especially amongst the troops themselves, enthusiasm derides the pretensions of any rival to the lance.

We seek for a middle way, pointed out by experience and a due consideration of the powers of the weapon itself.

It would be a serious error at the outset to imagine that in the future our Cavalry will be held in the back ground as they were in 1866, or that their tasks hereafter will be as easy as those of 1870-71.

Undeniable facts speak to the contrary. According to the *Militär Blatt*, No 99 of 1873, it appears that of the thirty Cavalry regiments appointed by the French to compose their cavalry divisions, twenty-one are crowded into the corps-centres of the Western Belgo-German frontier, only nine left in the immediate neighbourhood of Paris, and not one is to be found in the whole south of France.

With such a peace organisation of cavalry made by the French along their frontier, what preparations we should make can be but a question of time. However a most satisfactory activity in the direction of the instruction of cavalry masses was shown in the extended cavalry manœuvres held in the autumn of 1873, under Generals Schmidt, von Schlotheim and Graf Brandenburg at Raguhn, Buxtehude and Yüterbock.

As a result of those manœuvres, we get a fresh insight into the future of cavalry.

Not as in 1866, will the cavalry masses be retained in the rear of armies until the opportunity of pursuing a beaten enemy presents itself.

Not as in 1870 will the cavalry be kept back until the strategical marches of the armies upon the theatre of war have been completed. No, they will carry the declaration of war into the enemy's country, they will interrupt the mobilization of his armies, break through the lines of communication upon which he is relying for the transport of his provisions and war materiel, and so disquiet the concentration of his armies. Their armament will be governed in the strongest degree by the opposition to these enterprises made by the enemy's cavalry and which must be anticipated; nor must the services they will have to perform later on in scouting, be overlooked. During the cavalry manœuvres conducted by General von Schmidt, the *Altmarkische Uhlán* regiment found itself always in the first line of battle; this, in accordance with the acknowledged fact that not only for the shock in mass, but also for single combat, the lance in cavalry engagements remains the queen of weapons. This results from the moral effect produced by a closed up advancing mass of mounted lancers and the physical effects of lance wounds.

The Uhlan attacks during the last campaigns are eloquent witnesses, and with reference to the opinions expressed above, a short allusion to them cannot prove otherwise than interesting. From the commencement however, it unfortunately has to be borne in mind that a result thoroughly worthy of the weapon must not be looked for, as the incomplete use made of Cavalry masses never gave the opportunity for more than one Uhlan regiment to attack at a time, and other disturbing circumstances arose, which cannot be attributed to a shortcoming of the weapon.

As for example, when the 1st Uhlans on the plateau of Wisoko, attacked without reserves the enemy's Cuirassiers. During the advance to attack, a second detachment of Cuirassiers appeared suddenly on the right flank of the first, the Uhlans divided themselves into two and a half squadrons and one and half squadrons; cohesion was lost and the enemy although repulsed was not hurled back with full effect.

At Koniggratz the 4th Uhlans came upon the Austrian brigades Schindlocker, and Prince Solms, who with the Thuringen Hussars, and two squadrons of 3rd Dragoons formed a disorganised medley. The formation for attack of the regiment was not waited for; but "the leading half troops attack before the others of the leading squadrons had formed left, the other squadrons following in echelon" (Head Quarter Staff record.) Thus driblets were absorbed by the mass instead of a decisive closed up attack having been delivered.

On the other hand on the same day we see the 11th Uhlans delivering an attack after a completed formation, and thereby releasing three squadrons of the 3rd Dragoons and completely routing the Brigade of Windishgratz Cuirassiers. These after having been thrown out of their tactical formation by the Uhlans, lost on that day twenty-two officers and 248 men.

When we allude to the engagement of Cavalry masses, episodes of a more interesting nature present themselves, as on the left of the field at Ville sur yron on the 16th August 1870. There, on one occasion eighteen cavalry regiments found themselves drawn up in opposition to each other, but again only one Lancer regiment on each side found itself engaged. The attacks delivered by these two regiments, the 13th Uhlans and the French Lancers of the Guard, are full of instruction. We will follow the vivid account of Major Köhler. The 13th Dragoons (Prussian), having driven the 2nd Chasseurs d'Afrique out of the field, rallied. Attacked then by the 2nd and 7th Hussars (French), they had, in conjunction with the 4th squadron of the 1st Dragoons of the Guard, repulsed these also. In the meantime the French cavalry were reinforced by the 3rd Dragoons, and by them, a combined attack was directed against the 13th Dragoons (Prussian), to save whom the 19th Dragoons and 13th Uhlans (Prussian) hastened up, and finally upon the French side a Lancer regiment of the Guard appeared upon the scene.

An eye witness belonging to the 19th Dragoons (Prussian) relates, that the impression produced on the French Lancers by the closed up steady advance at the gallop of the Uhlans (Prussian) was most perceptible. For, with the evident intention of avoiding this attack, they threw themselves upon the 19th Dragoons (Prussian). The result, as accounts shew, was that their left flank became mixed up with their own Dragoons, and their right was assailed by a diverging squadron of the Uhlans, this followed as a natural consequence of their crowding away. The narrator accounts for the heavy loss of the 19th Dragoons (Prussian) amounting to twelve officers, 113 men and 95 horses, to the superior effects of the lance; both the remaining squadrons of the 13th Uhlans charged the French Dragoons of the Guard, and, as the account describes, "already from a distance with loud hurrahs, whilst on the other hand the French Dragoons wanting in elan, advanced at the trot, and gave the impression that although unwilling to turn tail, yet the proper energy necessary for a charge, was wanting. The two Prussian squadrons, as the fruits of victory, brought officers, men and horses of the enemy out of the fight.

Certainly this is not in agreement with the account of Bonies, according to whom the Dragoons of the Guard "tombent sur les Uhlaus et les abiment." As however upon the next page of his brochure, he remarks "nos malheureux Lanciers sont pris pour des Dragons Prussiens et massacrés sans pitié," the conclusion is justified that the destroyed Uhlans were Lancers, upon whom their countrymen had fallen in rear. This regarding the attacks of Uhlans. They show in detail the superiority of the lance over other weapons and according to the view we take of the question a superiority which will become more and more apparent in the future. The Prussian lance, being the farthest reaching weapon of offence amongst those possessed by European cavalry, secures to the soldier who is master of it, a superiority even in single combat.

It is known that in 1866, the Austrians protected themselves from the effects of German blows, simply by a judicious folding and wearing of the great coat, on this an order was issued to the Prussian cavalry to resort to thrusting with their swords. Since then the shape of the sword also has been modified to make the point more effective, and authorized instructions "in the use of the point" have been promulgated to the cavalry. These measures originated in the experience that the blow of a sword at the best, may wound an enemy, but in most instances arouses, rather than weakens him, where as a thrust acts with an enervating or deadly, and certainly with a disarming effect. These considerations joined to its length bespeaks the superiority of the lance for single combat.

We may here be permitted to make mention of a small engagement of Uhlans which took place in 1866, at Czervenhora, on the authority of the head quarter staff account, and the testimony of an eye witness. An attack was made upon two and half squadrons of Mexican, Uhlans by two and half squadrons of the 3rd Uhlans of the Guard, who

issued in extended order out of the village. The formation of the Prussian Uhlans necessitated single combats. The melee only lasted ten minutes, during which 6 officers, 65 men, and 35 horses were killed or wounded, exclusive of such of the wounded Austrians who dragged themselves from the field. This small engagement shows therefore casualties amounting to ten per cent. whereas the Cavalry engagement on the plateau of Wisoko of long duration, in which the Austrian Infantry opposed the 4th Dragoons, and contributed the largest share of the losses incurred, showed a loss of but eight per cent.

The estimation in which the lance is held by other armies can also be appreciated by throwing a glance upon the armament of their cavalry.

The French have disbanded the Lancer regiments, probably, as the men and horses are not considered physically equal to the development of the powers of the lance, and they do not allow themselves to expect the recurrence of engagements such as that between their Lancers of the Guard and the 19th Dragoons.

In the Russian Army all the Cosacks carry lances, of the Cuirassiers, Uhlans and Hussars the front ranks only, their Dragoons carry none; an imposing array of Lancers. Upon this should not an increase rather than a decrease in the number of regiments armed with lances ensue. The Russian lance is shorter than ours, and being weighted at the butt end its reach for thrusting is increased, but its handling thereby has become more difficult. The Austrians give lances to the front rank of their Uhlans only.

For the reasons detailed we cannot hold the abandonment of the lance as at all opportune, even if it could not be carried simultaneously with the carbine. This latter idea is assumed by the Belgian Captain Lahure (*la cavallerie et son armement depuis la guerre de 1870*) and for this reason, in accord with Moritz von Nassau he would divide cavalry into two categories, Lancers and Carbiniers. A brigade having to serve as a veil in front of an army, should consist of a regiment of Carbineers and one of Lancers, the Lancers forming the supports of the advance and rear guards, and also as main body to all detachments. Regarding the matter from the ground he occupies in his argument, why, we must grant the correctness of his deduction; but as we start with different ideas on the question of the armament of the Uhlan so a different result in their employment arises. It would be most difficult to arm certain cavalry regiments with a view to their employment in a certain specific manner. We should find that such a theory of predestination would be sadly interfered with during a long campaign. If we acknowledge certain conditions may arise which render the armament of the cavalry with the carbine necessary, then let them be armed with it as far as possible. It is in the spirit of the mounted offensive to despise the firearm; well, but let that firearm be only given to surmount, for that offensive, obstacles which would prove dangerous or unconquerable to the *arme blanche*, unaided. That cases will occur, where an obstacle must be forced and cannot be ridden round, is proved

by the history of war. The debouching of the 4th Cavalry division out of the Hagenaur Wood was impeded through a few skirmishers retaining possession of a farm building at the mouth of the defile. In the defiles of the Vosges a few men detained whole squadrons of Uhlans and Cuirassiers. During the Cavalry manœuvres under General von Schmidt, the manner of garrisoning, and retaining defiles until the Infantry could arrive, was a question which was much debated, also the seizing of bridge defiles, and the defence of villages by cavalry, which had been surprized therein, &c., &c.

Contrary to the hitherto existing fundamental rule of the Uhlans, it had to be permitted, that the aid of the other arms should be looked for or the matter avoided altogether. We would therefore be prepared to go so far as to sacrifice the lances of the rear rank, notwithstanding the unfavorable moral effect and inconvenience, resulting from a mixed equipment. We however consider that such a sacrifice need not be incurred, under the provision that mounted firing be entirely abolished. The rule made by Frederic the Great, for the Prussian cavalry, to avoid it in all close formations, has always been steadily adhered to by them. It must also cease when scouting in extended order, and the firearm be then replaced by agility and intelligence; the purely moral support afforded by the crack of the carbine we must be prepared to relinquish. The efficiency of skirmishers of all descriptions of cavalry, is greatly impeded by the loosening and readjusting of their carbines, and the Uhlan with his lance would find himself so far embarrassed as to require the assistance of the squire of the middle ages.

When however the carbine is attached to the horse, and there remains, until its use for dismounted duty is called for, then without, materially inconveniencing the rider we only find the dead weight on the horse increased. The carbine in its cover attached to the wallet and breastplate leaves full space to the Uhlan for the thrust during a charge, and for changes to the right and left in single combat. Parrying and waving to the rear is somewhat impeded, but as in practise there is the power of using the butt end, this becomes a matter of but secondary importance.

The objections therefore on the score of a loss in efficiency, are reduced to the consideration of an increase of weight upon the horse of between 7 and 8 lbs. The employment of lighter horsemen, a selection of better weight carriers as remounts, fuller rations, these would help to surmount this difficulty.

A retrospective glance upon the past armament of cavalry will now prove interesting. In former times we had the Black riders who held themselves invincible with armour, sword and firelock; the famous Polish men-at-arms with helmet, breast plate, sword, carbine and a brace of pistols, the Polish Uhlans armed in like manner except in that they exchanged the breastplate for the lance.

The mounted men of Frederick the Great: Dragoons with long

firelocks, pistols and swords ; hussars with carbines, brace of pistols and swords, cuirassiers with cuirass, brace of pistols and broad sword, a cavalry who under Seidlitz covered in mass a distance of 280 miles in thirteen days, and on the exercise ground at Breslan, rode charges of a length to which we have not again attained.

In more modern days Napoleon's Chasseur-Lanciers ; the Polish Uhlans who seized the defile of Somma Serra ; the Cosacks of whom an eyewitness speaks, " they carry lance and firelock together, the former without an arm sling, and the latter a muzzle loader." These examples show what a heavily armed cavalry is capable of performing, and we surely may assume that our Uhlans if better mounted could perform yet heavier tasks. The training of the Uhlan gives rise to many of the objections, which are brought forward in arguing against furnishing him with a carbine and our remarks regarding the Cosacks lead us up to this subject. We fail after our experiences gained during past summers to recognise in the matter of instruction any difficulties. Without holding the musketry instruction of the infantry at too cheap a rate, we believe that the foot drill, comprising skirmishing and target practice as introduced by the school of Musketry at Spaudau for the Uhlans, can be carried on without detriment to the mounted drill. By a partial arming with the carbine it becomes possible to select the more intelligent individuals from the ranks, and these would devote themselves to the matter with the greatest interest and emulation.

By turning to account the intervals of rest given to the horses on the drill ground, by abandoning mounted firing and foot drill in close order, time sufficient will accrue to form a corps d'élite from the more intelligent moiety of the men whilst the more awkward can without interruption carry on their drill both mounted and foot. It follows from the view we take of the impracticability of the Uhlan using his carbine when mounted, and further from the demands which will be made upon him to act on foot, and which he must be prepared to meet, that the distribution of the carbines to the flank files of half troops is not advisable and supplying them to the rear rank far more desirable. This latter proceeding would we believe ensure the following advantages :—

I. The more awkward and heavier troopers would be entrusted with the lance only, and the shock of the front rank by their presence would be strengthened. The more agile and lighter men compensating for the extra weight of the carbine.

II. The dismounting for fighting on foot, in comparison with flank files having the same object in view, is rendered much simpler. On the word of command, " Prepare to dismount " the flank files must distribute themselves through the half troops, in order to resign their lances and horses, whereas, a rear rank need only on a second word dismount, and on a third say, " Rear rank dress on front rank," lead forward, give up lance and horse and step to the front. They would then fall in by half troops under command of an officer, and be told of

by the history of war. The debouching of the 4th Cavalry division out of the Hagenaur Wood was impeded through a few skirmishers retaining possession of a farm building at the mouth of the defile. In the defiles of the Vosges a few men detained whole squadrons of Uhlans and Cuirassiers. During the Cavalry manœuvres under General von Schmidt, the manner of garrisoning, and retaining defiles until the Infantry could arrive, was a question which was much debated, also the seizing of bridge defiles, and the defence of villages by cavalry, which had been surprized therein, &c., &c.

Contrary to the hitherto existing fundamental rule of the Uhlans, it had to be permitted, that the aid of the other arms should be looked for or the matter avoided altogether. We would therefore be prepared to go so far as to sacrifice the lances of the rear rank, notwithstanding the unfavorable moral effect and inconvenience, resulting from a mixed equipment. We however consider that such a sacrifice need not be incurred, under the provision that mounted firing be entirely abolished. The rule made by Frederic the Great, for the Prussian cavalry, to avoid it in all close formations, has always been steadily adhered to by them. It must also cease when scouting in extended order, and the firearm be then replaced by agility and intelligence; the purely moral support afforded by the crack of the carbine we must be prepared to relinquish. The efficiency of skirmishers of all descriptions of cavalry, is greatly impeded by the loosening and readjusting of their carbines, and the Uhlman with his lance would find himself so far embarrassed as to require the assistance of the squire of the middle ages.

When however the carbine is attached to the horse, and there remains, until its use for dismounted duty is called for, then without, materially inconveniencing the rider we only find the dead weight on the horse increased. The carbine in its cover attached to the wallet and breastplate leaves full space to the Uhlman for the thrust during a charge, and for changes to the right and left in single combat. Parrying and waving to the rear is somewhat impeded, but as in practise there is the power of using the butt end, this becomes a matter of but secondary importance.

The objections therefore on the score of a loss in efficiency, are reduced to the consideration of an increase of weight upon the horse of between 7 and 8 lbs. The employment of lighter horsemen, a selection of better weight carriers as remounts, fuller rations, these would help to surmount this difficulty.

A retrospective glance upon the past armament of cavalry will now prove interesting. In former times we had the Black riders who held themselves invincible with armour, sword and firelock; the famous Polish men-at-arms with helmet, breast plate, sword, carbine and a brace of pistols, the Polish Uhlans armed in like manner except in that they exchanged the breastplate for the lance.

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into subdivisions, each under a non-commissioned officer. If the men of the front rank be furnished with a double lance socket they could easily sling the second lance and take the horse in hand, formed then into a double rank they would follow as close as possible the various movements of their comrades fighting on foot, in order to withdraw them as rapidly from the fight as they were thrown in.

III. As many of the Uhlans are thus furnished with carbines as can be used without interfering with the mobility of the remainder and the squadrons can throw double the number of rifle men into the fight, and with greater rapidity, than can be done by the system of arming the flank files.

We would thus, in contradistinction to the Austrians and Russians, by the retention of the lances, maintain undiminished for our Uhlans their full former power in the charge as well as single combat, and have also endeavoured to make effective action when dismounted possible for them. Joined to the prospect of such a glorious share in the cavalry engagements of the future are the heavy demands which will fall upon the Uhlan in time of peace. Should our idea be considered advisable and feasible of making a Corps d'elite of the Lancers, assistance must be given them to rise to such standard of efficiency.

In regarding the question of what general armament is best adapted for the cavalry, the Uhlans can stand as witnesses both for and against. Horses badly formed and untrained men who cannot ride, these are as unsuitable in a lancer troop as a sieve to carry water. The Virginian Cavalry in the American war threw their lances away as they only served to impede them. The Uhlan remounts must be from best horses Prussia can provide, not the refuse, after the Cuirassiers have selected the most powerful and the Dragoons and Hussars the most active. Further the horses feeding should be more liberal to enable him to undergo a severe course of training to fit him for single combat with the lance.

Whether a Prussian or a Pole, the Uhlan should be a horseman from his youth up and not as a recruit mount for the first time into the saddle. The exchange of bad horsemen for good should be made possible. The special privilege of exemption from compulsory after service in the Reserve should be held out as an inducement to secure a four years' engagement to serve in the ranks.

The power of supplying vacancies as they may occur is the only limit that we can see to the number of Uhlan regiments.

III.

SOME REMARKS ON THE VALUE OF THE FORT OF
TARAGURH AS A MODERN MILITARY POSITION.

THE fortress of Taragurh which overhangs the important town of Ajmere in Rajpootana, is now rapidly falling into ruins. The stones which formed its walls are being utilized as building material in some parts, while in others the hand of time is gradually effecting gaps in the once massive walls. To me it has been a matter of regret that a fort of such grand historical associations, of such high strategical value, and possessed of such unusual natural advantages should be allowed to crumble away as if it were the site of a deserted and pestilential village. I have a strong conviction that we are making a mistake in neglecting it, and though I feel that no words of mine are likely to add weight to arguments which I am sure must have been previously urged by military men residing in this province, my interest in the place leads me to give a short account of its past history, gathered from native manuscripts, and an accurate description of its present state, with a few notes of what, in my opinion, its value is, together with the reasons for the belief I hold.

As the value of Taragurh is based on the importance of Ajmere, of which it may be considered the citadel some mention of that city ought to precede any description of the fort. Ajmere has always occupied a leading place in the history of Rajpootana. In ancient days, before the Mahomedan had established his supremacy, it was the capital of the Chohan Rajpoots, which house in the 13th century produced Prithwiraj, the last Hindoo emperor of Delhi. During the Mogul empire, it never ceased to be of considerable importance, and after the death of Akber it became the summer residence of the Emperors of that house. On the bund of the artificial lake, named the Anasagar (after the Chohan King who made it,) Jehangir constructed for the use of his court and zenana both marble palaces, and shady gardens, and it was at Ajmere that Sir Thomas Roe the ambassador of Elizabeth and James 1st was received by that Emperor.—His memoirs, and the papers of some of his retainers give ample evidence of the splendors of Ajmere, and the magnificence of the court which adorned it. In comparison with it the pomp of the English Monarch in those days seemed to Sir Thomas but tinsel grandeur. On the dissolution of the Mogul dynasty the Rahtores of Marwar established themselves at Ajmere, and to this day a genuine Rahtore will speak of Ajmere as a fundamental portion of the sceptre of the house of Seojee, the founder of that throne. It was however wrested from them by the Mahrattas, who found no doubt in the strong fort of Taragurh, a formidable position, from whence to swoop down annually on the surrounding district. When the progress of events brought the English into these parts, Scindia was in possession and by him it was ceded to us in the year 1818.

The town lies in a small, and rather fertile valley nearly surrounded by rugged hills. The block of hills in the vicinity, is an off shoot from the main Aravelli range, which loses its character of an unbroken mountain range near Beawur, a town about 30 miles south-west of Ajmere. It forms the water shed of two distinct system of rivers one of which debouches in the Runna of Cutch, and the other falling into the Chumbul feeds the stream of the Jumna. Although therefore the town is in a valley, its elevation is considerable, being about 1650 feet above the sea. One can therefore easily comprehend how grateful its comparatively temperate climate was to the Mogul emperors after the dizzy heat of Agra. The approach to the city from Agra is from the north, from which direction the imperial road, runs through a rough defile known as the Gogra pass (*Ghata*). From this point a perfect view of the city, the citadel and the valley is obtained. The 'lay' of the valley is nearly north and south, widening out to the east after the city is reached. From the pass the city lies directly to the front about a mile and a half distant, and immediately behind and overhanging it rise the craggy heights of Taragurh, the body of the fortress being on its extreme summit at an elevation of nearly 3000 feet above the sea—whatever of grandeur may have once belonged to the town has long since departed. From a distance its white walls, and imposing keep are very striking, but the place is a whited sepulchre, within the walls there is much squalidness, only relieved here and there by a noble monument of the past. The city wall girdles a space somewhat larger than the present town, and its southern portion climbs the lower slopes of two spurs, which run down from the body of the Taragurh range into the valley below. It is difficult to guess what principles could have guided those who traced the enceinte, for it is not carried sufficiently far to embrace any ridge, or command any vulnerable point. Indeed apart from the hill of Taragurh, few weaker military positions could be conceived than that of Ajmere. The hills rise on every side, and overlook the town from every point of the compass, and even the 'keep' which is a strong massive fort, situated at the northern angle of the city wall, considerably higher than the body of the town, and strengthened by flanking bastions and a broad moat, is completely at the mercy of a besieger possessing artillery. It will thus be evident that to give any military strength to Ajmere, Taragurh is all important.

The hill on which the fort is built is 2700 feet high. It lies to the south of the city and forms the north-east extremity of a range which commences from the south of the town, and runs for two or three miles in a southerly direction. Looking at it from the north over the city the sky outline shows two hills of nearly equal height, connected by a saddle. The hill on the left, which is the loftier of the two is Taragurh proper. Its summit is flat, broadening out into a small piece of table land considerably more than a quarter of a mile in length and perhaps a little less in breadth; the other hill has a sharp, knife-like ridge and has very steep slopes both to east and west. Both hills throw down long spurs with sharp ridges into the plain; the lower portions of these spurs, as

I have mentioned being brought within the encinte of the city wall. Between the two ridges lies a deep gorge studded with fine mango, and Indian fig trees, and through it runs the road from the city to the fort. On reaching the saddle the outer line of walls is encountered. Passing through a massive gateway the road turns slightly to the left, and the ascent of the steep portion of the hill has to be faced; the road from this point running up in zigzags until the summit is reached, where the body of the fort is entered by a gateway facing north-west. Returning for a moment to the saddle, and looking to the south, there lies before one another rather narrow gorge, which after running straight for about three hundred yards, take a sharp turn to the left reaching the plain behind the Taragurh hill, thus isolating it entirely from the main range. At the point where the turn of the gorge takes place is a perennial spring of water, known as the Noor Chushmah, and a tope of trees; on the further side of the valley the hills rise to nearly the same level, but all are steep and impracticable. The valley is brought within the precincts of the fort by a line of wall running from the fort itself down to the saddle, (where, as I have said, the road from the city passes through it,) climbing up the opposite side and on joining the summit being carried along the ridge which overlooks the valley. On reaching the point where the gorge meets the plains it is brought down the hill side, across the gorge and rejoins the fortress on its southern face. The walls of the fort are irregular, following for the most part the contour of the hill. In former days they must have been very strong, being many feet thick and constructed of large flat bedded stones, put together however without mortar. The position is so strong that the strength of the walls can add but little to it. On every side the slopes of the upper portion of the hill are very steep, in some places perpendicular. Much of the wall has been removed, for after the hill was abandoned as a fort, residents of Ajmere began to occupy it as a sanitarium, and the garrison of Nusseerabad also annually sent its invalids there for the benefit of the fresh air and cool nights which usually prevail. The stones of the walls furnished the material for the new buildings, and if ever the hill becomes again a military position, the debris of the houses will probably have to contribute to the restoration of the walls. Whatever the arrangements in former days for the housing of the troops may have been, no traces of them are now visible; but one very valuable relict of the former occupation remains, in the shape of several masonry reservoirs constructed in hollow spaces, on the hill top, all but one of which are within the girdle of the outer wall. The positions of these tanks have been chosen with much judgment, and considering the limited catchment available they receive a very large supply of water. Very little care however can have been taken to keep the water clean and sweet. By the time the dry weather arrives, it is usually of a greenish hue, and though possibly wholesome enough is not of such a kind as to suit our fastidious taste. Consequently the troops and the European portion of the community get their supply of drinking water from the plain. With a very little trouble, however, the water might be kept as clear

as that of a well. The tanks though deep are not large superficially, and they could easily be closed by wooden covers, which would both reduce the temperature of the water and stop much of the evaporation which now amounts to about six feet in the year. In the event of their ever again becoming the source of supply for a fort, it would be advisable to surround them by a wall in some manner, and render the approach secure by a covered way. The idea of poisoning the water would readily suggest itself to an enemy who would despair of fighting his way into the stronghold.

The highest and flattest place within the walls—the place in fact which, if we were to construct a fortified post for the small garrison we could afford to locate there, we should select for the purpose, is now occupied by a Mahomedan mosque of the Sheah persuasion, and to it is attached a considerable village said to be inhabited by the priests, and servants who are required for the ministrations in the temple. The existence of this temple is a strong obstacle to the reoccupation of the hill, for it is of considerable antiquity and great sanctity. The priests cling to their possession of the hill top with extreme tenacity, and the sum which would tempt them to leave it would be very large indeed. We are also under an obligation to them for the loyalty and goodwill displayed by them during the Mutiny and naturally enough they take good care that we shall not forget it. The Khadim or head priest of the establishment is an aged, but fiery old man, ready to dispute every encroachment on what he conceives to be his rights, and his wrath has been recently hotly aroused by the construction of new barracks for the invalids from Nusseerabad, which according to him approach his sanctum too closely. On the occasion of the visit of the Commander-in-Chief of Bombay to the fort last cold season, while offering the party hospitality in the shape of sweet, but nauseous biscuits, and displaying innumerable certificates from officers in authority, from among which however he could never extract the one he was in search of, he emphatically protested against the latest encroachment. He was nothing daunted by the high position of the official he addressed, but unfortunately His Excellency's knowledge of the vernacular was so limited, that he failed to be impressed with the cogent arguments adduced. The subjugation of this old man would be required before we could be considered masters of the position. An attempt in this direction was I believe made, when some years ago, the question of the reoccupation of the fort was under consideration, but either the opposition he offered was so energetic, or our attack was so languid that his arguments gained the day, and it was determined by government that it was better *quieta non movere*.

The approaches to the fort may be said to be three in number; though of these, two unite before the outer walls are reached. All three are under the command of the fire of the fort. That most frequently used passes through the town of Ajmere, after leaving which it enters the gorge before alluded to, and reaches the outer line of walls at the saddle. The second is a new road, lately constructed by

the District Committee. It leaves the city of Ajmere on its left, gradually ascends the spur of the hill on the right, and after passing round the city wall joins the road which passes through the city in the gorge. The third road is on the southern side, and was I believe constructed for military purposes to admit of troops being marched up the hill from the direction of Nusseerabad, without subjecting them to running the gauntlet of fire from malcontents in the city. It meets this object admirably, and if only it were a little widened, and some of the steeper gradients reduced, it would answer every purpose. In its present state the labor of transporting even light artillery to the fort by it would be both arduous and dangerous. It is difficult to understand why such a road was sanctioned, if the project of holding the hill as a fort was rejected. In its present state, should an emergency arise, it is very doubtful whether it would be a prudent step to attempt to hold it. Even if we could keep the enemy off in spite of the dilapidated walls, by defending the barracks or mosque, we should be starved out of it in a very short time. There is at present not a single gun in the place. During an emeute they could not easily be conveyed to the summit. Without artillery we should be powerless over the city, but three guns could coerce it at will, and extract from it by the mere threat of a red hot messenger, an unfailing supply of provisions.

The early history of Ajmere and Taragurh, like that of all ancient towns, is involved in conflicting legends, garnished with many a miracle, and dealing audaciously with the extremes of exaggeration. No writer, whether Mahomedan or Hindoo, could speak of an army without dealing with hundreds of thousands, while on occasions the slaughter must have left but a scanty remnant to perform the funeral ceremonies. The foundation of the city is ascribed to one Ajipal, a Chohan Rajpoot. Of course the date of the event is quite untrustworthy, but it is set down as Sumbut 202, or A. D. 146. From its founder, or, as some say, from Aja, "a goat," it received its name of Ajmer, or as it was sometimes called Ajirdoorg,—the meaning being in the first case the invincible hill, in the second the invincible castle, in both instances the allusion evidently being to the hill of Taragurh, for the city is in the valley. Some legends make Ajipal of humble origin, and to this the termination Pal lends color, as the Pals or Palis were a pastoral tribe: but whatever his origin Ajipal seems to have established a very powerful kingdom, for he is seldom mentioned without the affix *Chuckwa*, or universal potentate, a title given to only six of the innumerable kings who reigned in India previous to the Mahomedan era. One Mahomedan legend introduces his name as that of the reigning king during one of their invasions under Meer Sayyid Imam Ali, in the year 121 of the Hejira or A. D. 743; but as the names of his two sons are given as Besul and Anah, and as these are two well known monarchs of the line who lived in the eleventh or twelfth century A. D., it is evident that the author merely strung together the best known names without any regard to chronology. It is probable that the name of the king whom they did encounter was Dhola Rae, who reigned, according to Hindoo authorities, about the

year S. 741, or A. D. 685 ; and was killed by the Mahomedans. This irruption seems to have been a very determined one, and the Fort of Taragurh—then also called Gurh beetli—was taken by assault, the only occasion on which such a feat is distinctly recorded. The legend of this invasion is so thoroughly characteristic, that I crave indulgence for inserting it. The story commences with an account of the sufferings of one Roushun Ali, a Mahomedan missionary, who found his way to Ajmere. On arrival he had a dispute with a milk woman, who was carrying a vessel of curds to the Rajah. Bystanders soon interfered and carried the stranger to the cutchery. The king was absent, being out hunting. His officials condemned the unfortunate man to death. The king however returned before sentence could be put into execution, and commuted it to the mutilation of one finger. The finger straightway flew to Mecca and told its own story, an army was equipped which after casually engaging any Pagans who were to be found, and capturing a marvellous steed called *Khinuk*, encamped on the plain of the Anassagur, and gave themselves out as horse merchants. As their numbers amounted to 120 thousand, it is difficult to understand how they managed to persuade the Rajah of the truth of their assertion. A series of events follows, all more or less connected with the sale of the horse *Khinuk*, for which both the Rajah and his sons had conceived a desperate fancy. The deal however terminated in a general engagement, in which almost every body, including the leaders on both sides was slain, but victory remained with the Mahomedans who seized the citadel. Whether this was actually the expedition which captured Taragurh, and caused the death of Dhola Rae is immaterial. There are at any rate grounds for believing that Dhola Rae was slain defending his capital on the first serious invasion of the Mahomedans. The dominion of the invaders must have only been temporary, for we find Manika Rae, brother of Dhola Rae, in possession a short time after, and in a subsequent invasion he appears to have shared his brother's fate. From this period nearly every prince of the house seems to have been called upon to do battle against the followers of the Prophet ; and from the prominent position assigned to them in these conflicts it is evident that they occupied a very high position among the sovereigns of India. In the catalogue of princes mentioned by the bard Chand, who fought under the standard of Beesuldeo (or Visaladeva) more than twenty powerful princes are named, among whom is the Gehlote Chief, now represented by the Rana of Oodeypore. Ferishta, the Mahomedan historian, also mentions the rulers of Lahore and Peshawur as belonging to the Chohan family and being vassals of Ajmere. These facts abundantly prove the importance of Ajmere, and account for the frequency with which the Mahomedan arms were directed against it. In A. D. 761, Hunsraj, King of Ajmere, defeated Nazir-ooddeen (or as some suggest Subektegin). A successor of his, Beer-balund-deo was slain by Mahmood of Ghizni, when defending Ajmere. Subsequent to him two great names occur in the kingly rolls. One, that of Bissuldeo, the other that of Prithiraj, whose deeds have been chronicled with almost Homeric grandeur by Chand, the prince of Indian bards. What invasion

Bissuldeo repelled it is difficult to say, for the Mahomedan historians make no mention of any grand defeat, but there are many facts to support the Hindoo version, and the silence of the Moslem chronicle may be to cover a disastrous record of defeat. The date of this event is probably about 1050 A. D. For some generations after this event the power of Chohan appears to have gradually declined, but it blazed forth again with increased splendour during the life of Prithiraj, between the years 1160—1200 A. D. Previous to this the Tuar Dynasty at Delhi seems to have established a preponderance, for we find on the death of Aurungpal, king of Delhi, that the translation of Prithiraj, who was nephew of that monarch, to that throne gave him a most commanding position among the monarchs of Hindoostan. As his sister had married the Sesodia king of Chittore (now Meywar), who was also a powerful potentate, his influence was almost undisputed; but he provoked enmity among the Rehtores of Kanouj and the Chalooka Rajpoots of Putun Anhulwara, and these being too weak to overcome him called in the aid of Shabudin, the famous Tartar king. After a stupendous battle of three days' duration, Prithiraj and most of his chiefs were slain, and shortly after Delhi fell before the invader. Under that catastrophe the splendour of the Chohan race seems to have sunk for ever. After the decay of the Ajmere house, that of Chittore rose into pre-eminence, and despite of the sack of that famous capital in 1303, by Alla-oddeen, it regained its power, and its king Hameer forced Mahmood, the successor of Alla, to cede to him among other places the fortress of Ajmere, though it must have soon slipped out of his grasp, for his son Khaitsi is said to have wrested it from the possession of one Lilla Patan. In the possession of this family it seems to have remained until the advent of Akber, who after sacking Chittore, made Ajmere his head quarters for further operations against the Rajpoots; and we find more than one of his successors take up his position at that fortress, the moment complications threatened; and as the Rajpoots were constantly troublesome, it eventually became a regular summer retreat of some of the Mogul monarchs; for, besides its strategical value, it had acquired a great reputation among Mohamedans for sanctity, owing to the long residence in it of a saint by name of Khwaja Kootubooddeen renowned through Islam for transcendent piety, and hence it came to be considered such a desirable place of residence, that it received the name of Dar-ool-khair or house of good.

With the decline of the Mogul empire, as was to be expected, Ajmere again changed hands, and it was seized, opportunity offering, by the Rahtores of Marwar, who were then second to none of the Rajpoot tribes for bravery and military enterprize. Ajmere being near the border of that state, they could seize the opportunity the moment it presented itself. According to the Marwar chronicle Raja Ajit, in A. D. 1721, drove the imperialists out of Ajmere, and when in the following year an Army was sent to recover it under a General named Muzaffer, the Raja advanced to meet it, and compelled it to retire within the walls of Amber, the ancient capital of Jeypore. But the throne of

Delhi was not yet so weak as to brook such audacity on the part of a quondam vassal. A formidable army was again despatched and Taragurh invested for four months during the year 1723. Eventually the Rahtore prince capitulated. Seven years later, Abbye, son of Ajit, was made Viceroy of Ajmere by the Emperor. He appears to have forgotten to give it up again, and as the empire became weaker it gradually became a part of the kingdom of Marwar; and we next find the Rahtores and the Mahrattas struggling for the prize. Intestine feuds gave the Maharatta an opportunity for interfering, and that interference was conducted with such unscrupulousness and skill, that the Rahtores became involved in a maze of difficulties from which they were forced to purchase escape by the surrender of Ajmere, "the diadem of the throne of Maroo in 1754." From that hour, the strength of Marwar was broken, and though Ajmere was recovered again by Raja Pertap in 1787 the triumph was short-lived, for within four years it was again in the hands of the Mahratta. Those were the days of Mahratta dominion, and to them Ajmere was a place of no ordinary importance, and once gained they never dreamed of permanently surrendering it. From the command it gave them over Meywar, Marwar and Oodeypore, they had all Rajpootana at their feet and levied their annual imposts in unshaken security; and it was not until in 1818 we forced Scindia to yield the district to us that Rajpootana had rest. Under the ægis of our protection it has regained some of its former prosperity, but while we hold Ajmere it can never hope for real, however much it may be permitted nominal, independence. The power that has held Ajmere has for the last eleven hundred years been the leading power in Rajpootana, and its loss has surely signalled the advent of decay. This seems to me a proof it proof were needed, of its importance. We also have had experience of its merits, for during the Mutiny of 1857, we were able to keep our hold on the province by throwing a garrison of the loyal Mhair Regiment into the keep, now called the magazine. Luckily the organization of the rebels at Nusseerabad was not sufficiently good, nor their numbers sufficiently great to encourage them to attempt the siege of a comparatively feeble fortification like the magazine. But had the mutineers been possessed of determination, and provided with guns, we should have felt keenly the improvidence which permitted us to neglect one of the strongest positions in the province. The fort of Taragurh could laugh at the attempts of any Asiatic force. Starvation would have to do its work before an European garrison of any spirit would dream of surrender, but a few ill-served and feeble pieces could shatter the walls of the Magazine in a few hours, and from a thousand points direct a fire into its interior. It was of service once, it will be our fault if we are content with its weak protection a second time.

What I have written in connection with the previous history of this once important fortress, will serve to show the estimation in which it was held by one and all of the great dynasties of India. It in the following remarks I show myself at variance with the policy which has systematically neglected it since it came into our possession, I trust that

the candid expression of opinions which a residence of some years in these parts has forced upon me, will not be held to be unbecoming or wanting in respect to those high military authorities who have acquiesced in its abandonment as a military position. I cannot but believe that financial exigencies must have had a large share in the formation of a decision unfavorable to the military occupation of Taragurh. Against this class of argument the strongest case shatters itself, still, such an obstacle is not necessarily eternal, and the time may come when funds shall be available. In anticipation of such an event I would point out, what I conceive to be the strong claims of Taragurh to our attention.

If previous history is worth anything, it proves that the power which held Ajmere (the stronghold of which is Taragurh,) was nearly always dominant in Rajpootana. It was so in the days of Pritheraaj the Hindoo emperor of Delhi. It was so throughout the Mahomedan dynasty established by Baber. It holds true equally of Scindia, who during his occupation of the Ajmere districts, made the whole of Rajpootana as it were hewers of wood and drawers of water, extorting from them on every petty pretext the most unmerciful exactions. Again when those districts were ceded by Scindia to us, we at once assumed the ascendancy which he was compelled to relinquish.

Again—view the position of Ajmere geographically. It will explain at once why it has played such an important part in history. It stands in the heart of Rajpootana. It is obviously a position that no non-Rajpoot power but a strong paramount one could afford to hold, but in the hands of a Government which had established a moral and material ascendancy it was an unassailable position, and one from which blows could be dealt with telling effect. Jeypore, Oodeypoor and Marwar are equally open to attack from it, and except when a common league bound the Rajpoot princes together, its isolation was more apparent than real. The instances when all the Rajpoot princes made common cause are rare, for it was nearly always found practicable to play one off against another. But this was never allowed to stand as a pretext for starving the military establishments in the province.

Have events so altered the position of affairs, that we no longer need to secure ourselves against assaults? We, the weak in numbers in the midst of millions whom we compel to our will, but who do not love us one whit more than they did in olden days. I think not. The events of the Mutiny throw into the strongest light the fact that even the most inferior fortified posts were practically impregnable, as long as the command was in capable hands even under the most unfavorable circumstances, such as at Cawnpore we could not be driven out of the most paltry entrenchments. Had our forts been more numerous, well armed and well provisioned, we should not have had to yield a single district entirely into the hands of the rebels. This seems to be allowed by all, and if it be true of districts which are completely our own, and in the heart of our territory, is it not a fair deduction to make that in isolated positions like Ajmere we are more than ever bound to guard ourselves

by fortifications, impregnable to the native powers in their present crippled and effete state ?

I have described the natural advantages of Taragurh. It commands a large city so completely under its fire, that it would be compelled to supply the fort with provisions under fear of instant destruction. It is situated in the centre of districts, which without being rich, produce grain and cattle in quantities more than sufficient to supply any garrison we should be likely to throw into the place for many months. In addition to this, it promises to become the sentinel of a railway junction, as it already is of two important lines of communication from Delhi and Agra to Bombay and Baroda. It will probably be the head-quarters of the Rajpootana State Railways, whose workshops will be formed there as the most central position of the line. It will therefore become more than ever a most important strategical point, and it appears to me that to leave it imperfectly protected, in the face of all the advantages offered by nature, is a measure not consistent with sound judgment. What is the use of talking of these railways as military lines constructed to aid possible military operations, if we neglect to avail ourselves of ordinary precautions for their defence !

With due deference to more competent judgment, I submit that our military occupation of Rajpootana is not very secure, that is to say, it is only secure as long as our hands are free from complications in other parts of India. In the whole province there is only one European regiment, and two batteries of European Artillery. The battalion of Infantry is stationed in two garrisons, more than 100 miles apart ; nor is our native force very large, and even if it were we cannot afford to measure our strength by it. As the strength of a chain is measured by its weakest link, our ultimate test of our resources must be the strength of our European garrison, on which only we can rely in every conceivable emergency. The political surface is at present unstirred by a single ripple, but it may not always be so. The defeat of the Sikhs, and the annexation of the Punjab in 1849, seemed to have established our dominion on an unassailable basis ; yet in 1857 we were fighting for our existence. We cannot be too strong. The words of Sir Charles Metcalfe, it seems to me, should ever be before us—" My notions," he says " of Indian policy begin and end in a powerful and efficient army ; our real strength consists in the few European regiments scattered singly over a vast space of subjugated territory." And to strengthen these isolated regiments I maintain that we should avail ourselves of every opportunity to establish small strong forts in the most important positions. To this end Taragurh would be invaluable ; reconstructed with a special view to our requirements it could be held for any given time against any native army which could be brought against it, by a wing of an European Battalion and a battery of Artillery. It would be strong enough to be in itself a secondary base, and would thus render our position much stronger than it now is, depending as we do on distant bases such as Agra, Mhow, Ahmedabad and Deesa.

It is true that exclusive occupation for military purposes would be opposed by local interests and pseudo religious pretensions. As I have already stated, the Khadim of the Mahomedan mosque on the top, to whom we are under obligations which he is wise enough to magnify extravagantly, would oppose every obstacle in his power to our conversion of the hill into a military fortress, pure and simple. Our neglect of the hill has strengthened his pretensions. If on acquiring possession we had maintained it as a strong hold, and had swept him off the hill as an institution incompatible with a fortress under the sole care of Europeans, none would have dared to utter a protest. In the first blush of our success we were irresistible, and our little weaknesses unsuspected. Now that it is known that we shrink from any encounter with religious prejudices we are met at every step by arguments based on pretexts to which we are unable to assign with any confidence their real value. I am unable to give any idea of the effects of our ousting the shrine from the hill top. It is reputed holy and is said to be a place of pilgrimage for Sheeah Mahomedaus even from Persia, but whether there is any material power to give weight to its sanctity I have had no means of ascertaining. The native mind, always prone to evasion and inaccuracy, is more than ever so on the matter of religious institutions. The opinion of nine-tenths of them is worthless, even when disinterested. But as I have stated on a former occasion, it was contemplated to remove the village and the shrine, and the project was abandoned. But it does not follow that the difficulty is insurmountable. The offer of lands in the vicinity *might* melt the stern religious mind, as well as the worldly one. The question would then be, how much ? a question not for me to consider.

At the worst it might be possible to occupy the hill top without removing the village, merely placing it so completely under the command of fire that it might be dismantled in half an hour ; while the dimensions of the village might be curtailed, and rigidly confined to certain limits and a fixed population, and upon this population it would not be out of place to enforce amenities of military discipline which would render the quarters in the village not the most desirable piece of abode. I make this suggestion, both because where a miscellaneous population lives in the close vicinity of a fort strict military discipline must be observed ; and also because without some such pressure, I believe, it will be impossible to arrive at a true appreciation of what forms the smallest possible number of attendants required to perform the services of the shrine.

As a sanitarium Taragurh is not without merits, its climate is considerably cooler than that of the plains; it is said to be between five and ten degrees cooler. It effects a marked and rapid change upon men debilitated by the heat, and is favorable in fever cases. It forms the convalescent depot for Nusseerabad, and has been found so beneficial that during the last winter it has been enlarged, new quarters having been built, and as many as 70 or 80 men are now kept there du-

ring the hot months between 1st April and 15th October. We have therefore the germ of a garrison there, add to this, spend a few thousand rupees in fortifications and water reservoirs, provision it for a siege of six months, calculated for a thousand, or even 500 men ; mount it with efficient ordnance, and you will create a military centre of such strength that it will prove a rallying point in the first outburst of unexpected danger, and an invaluable base for offensive operations when we have recovered ourselves sufficiently to sally forth into the field.

R. G. LOCH, *Captain,*
Offg. Commandant
Mhairwarra Battalion.

IV.

A FEW WORDS ON THE SEVERAL INFERIOR CASTES, OR
CLASSES IN THE NORTH-WEST PROVINCES, FROM
WHICH RECRUITS MAY BE OBTAINED FOR
THE NATIVE ARMY IN BENGAL.

THESE may be divided into four classes.

1st. The "Agriculturist," who is always in action, which gives full play to his limbs, who is much in the open air, is generally healthy, subsists on simple food and is accustomed from infancy to obedience.

2nd. The Herdsman, who is even more accustomed than the former to changes of weather, is hardy, nimble, accustomed to frugal fare, and having a charge and responsibility is ordinarily fearless of man or beast.

3rd. The "Hunter," who, in addition to the above qualifications, has the advantage of a pursuit which confirms courage, sharpens address, and gives ready knowledge of ground and judgment of distance.

4th. The Mechanic, less preferable than the others, especially as in India, the performance of mechanical arts is almost sedentary, but useful as an occasional element in a mixed body, for the ready use of his hands, a correct eye and apt scholarship of exterior forms and exact movements.

Of these (the inferior castes, professions or denominations), may be made three classes—

First. Those preferable. *Second.* Those admissible. *Third.* Those objectionable for recruiting.

1st. Those preferable. These comprise the finest. They are—

1. The Akbur ...Courageous, athletic, good The Etawa and Agra cultivators. district.
2. Aheers ...Those near the Terai, are All Districts.
trustworthy, courageous,
well made and independent. Those near the
Jumna are often robbers
and thieves. They are
generally hardy and are
the strongest race in the
country.
3. Aheeriya ...Fowlers and Shikarees, ac-The Upper Doab.
tive and hardy, highway
robbers, and should be ac-
cepted with caution and
inquiry.

4. Aruk ...Hunters, rough and ready, Bundelkhund, Rewah
not much given to water. and South Mirza-
pore.
5. Baree ...Torchmen, faithful, " The All districts.
Baree dies fighting for his
master" is proverbial.
6. Buheyliia. ...Fowlers, and hunters, East of Oudh.
hardy, active and general-
ly of good character--must
not be confounded with
the Borias who are thieves.
7. Bunjara ...Hardy, adventurous, bold, Do.
violent in quarrel, move
about with their families.
8. Burgahie ...Like the Baree No. 5, take All districts ; east of
service with better class Oudh is the best.
of Hindoos.
9. Chumar ...The cultivator class, able- All districts.
bodied and faithful.
10. Dhanuk ...Reputed low, generally stout, Bundelkund Doab.
fearless class, trustworthy.
11. Dhangur ...Fellers of jungle, put their Goruckpore.
hands to anything, able-
bodied, willing.
12. Dhooneya ...Cotton cleaners, weavers, Doab & east of Oudh.
cultivators, good, strong
men, readily take service.
13. Dosadh ...Many of these fought under Lower Doab of Oudh.
Clive at the Battle of Plas-
sy, strong and hale, take
service readily.
14. Gurarya ...Shepherds, hardy, resolute, All districts.
active and trustworthy.
15. Ghoseo ...Cattle herdsmen, Mahome- Do.
dans, able-bodied.
16. Guddee ...As above, only Hindoos. Do.
17. Jaths ...Many varieties noted for Upper Doab, Delhi
independence of Brah- districts, Bhurtpoor,
minical influences, hatred Allygurh.
of Mahomedans, extra-
ordinarily good and in-
dustrious cultivators, eat
poultry and dont mind
a dram, should make
good soldiers.

18. Joolaha ...Patient, industrious, orderly, Benares district.
peaceable.
19. Kachee ...As above, cultivators garde- Allahabad, right bank
ners. of Jumna.
20. Khutuck ...This class in the Upper All districts.
Doab is of low repute,
they are of all trades,
butchers, horse keepers, &c.
21. Khunger ...Of unswerving fidelity in West Bundelkund.
service, and expert thieves
where not trusted.
22. Kooree ...Unsurpassed in industry as Lower Doab, across
agriculturists. Jumna.
23. Kulwar ...Distillers of liquor, athletic All districts.
and faithful.
24. Kemkur ...Take service of Hindoos, Allahabad & Benares
faithful. districts.
25. Lodha ...Laborious, notably faithful, Doab.
(not to be confounded with
Lodes.)
26. Lohar ...Laborious, resolute, faithful, All districts.
good for trial, mechanics.
27. Monegah ...Salt and saltpetre manufac- Eastern districts.
turers, of good repute.
28. Naek ...Few in number, sturdy, vide Benares & Allahabad
No. 7. districts.
29. Rangur ...Numerous in Shekawatie, Upper Doab.
prefer military service,
cultivators from which
selection should be
made.
30. Saentwar ...Class of No. 22 (Koo- Rohilkund, east of
rees) covet military Oudh.
service.
31. Tugga ...Industrious, able-bodied, dis- Upper Doab, Rohil-
posed to take service. kund.

CLASS 2.—*Admissible.*

1. Barheea ...Called Sanwallee and Sikli- Most districts.
gur.
2. Basphore ...Called Dhurkur, musicians. Do.
3. Beyldar ...Laborers, hard working, East of Oudh.
honest.

4. Bhat ...Mendicant class, bad, mimics, All districts.
and buffoons, agricultural,
are bold, popular.
5. Bheestee ...Proverb, " a bheestee and a Do.
turner (Khyradee) are
never seen as convicts in
a jail."
6. Bhootia ...Few in number, cultivators, Banks of Jumna.
honest.
7. Bhungee ...Sweepers, outcasts, brave and Doab.
aspire to military service
8. Bhur ...Called also Rajbhurs, a wild Nepal Terai, south of
race, resolute, daring, not Mirzapore.
easily amenable to dis-
cipline.
9. Bhurbboonja ...Grain-parchers, some affect All districts.
to be athletics.
10. Bind ...Make mats, nets, &c., some East of Oudh.
commit daring dacoitees.
11. Bunbula ...Rope makers ... Upper Doab.
12. Burhye ...Carpenters, occasional good All districts.
selections.
13. Burye ...Paun-grower, careful, steady Most do.
14. Burmwur ...Take to trade or service, are Goruckpore.
faithful.
15. Chupee ...Cloth-dyers printers, rarely Upper Doab.
take service, travellers.
16. Choonapurz ...Lime burners ... All districts.
17. Dailphora ...Faithful ... East of Oudh.
18. Dhankurs ...Mostly porters, able-bodied, East of Allahabad.
19. Dhurkar ...See No. 2.
20. Dussoondhur ...Discription of Bhat No. 4, Lower Doab, east of
Oudh.
21. Goryuda ...Much the same as Kahars, Allahabad.
boatmen.
22. Goundiya ...As above ... Benares.
23. Hulwai ...Confectioners, able bodied, All districts.
24. Jangrez ...Few left, by tradition lead Rohilkund.
troops into battle, singing.
warlike songs.
25. Khewat ...Fishermen, agriculturists, Doab, east of Oudh.
better class, take service.

26. Khor Pultay ...Numerous in Jodpoor, and West Rajpoot. Oodeypoor, are cattle drivers, herdsmen, a sturdy race, not particular about their wives, and indifferent as Hindoos to what they eat or wear.
27. Khujmuted ...Take service when they can Right bank of Jumna. get it ; usually chobdars of native chiefs are of this class.
28. Khutree ... Take service freely, good East of Oudh. at accounts, and that is all.
29. Khyradee ...Turners, industrious, respec- Do. lower Doab. table.
30. Kole ...Ploughmen, watchmen, any S. Meyapore Rewah. thing, are a depressed class, brave, sturdy and worthy a trial.
31. Komhar ...Potters and tilers, useful East of Oudh, all dis- and respectable. tricts.
32. Koonjra ...Vegetable growers, indus- Do. trious,
33. Kootwar ...Cultivators, of good repute Across Jumna. as watchmen.
34. Kumungur ...Manufacturers of bows. Lower Doab.
35. Kunjur ...Numerous, live in jungles, Do. Doab and east of bold, resolute. Oudh.
36. Kustora ...Thread spinners, of fair re- Do. pute.
37. Malee ...Gardeners, occasionally take All districts. service.
38. Myer ...Cultivators, an industrious Upper Doab. class.
39. Megua ...A bold race, jungly habits Kerowlee States. from childhood, prize gun and knife.
40. Meena ...Active, good scouts, adven- Agra and Rajpootana turous, require cautious selection, used to be notorious robbers and dacoits, should be good local soldiers.

41. Meo ...Like Meiwatees, caution ne- Delhi district.
cessary.
42. Meiwatees ...As above.
43. Moosuhur ...Jungly, take service occa- Borders of Behar.
sionally, do anything.
44. Oodhia ...Iron smelters, a depressed Allahabad.
race.
45. Pasee ...Numerous, varied character, East of Allahabad.
industrious cultivators,
good watchmen, notorious
thieves, cultivators, worthy
of trial.
46. Soorhea ...Inferior, but good class, take East of Oudh.
to various trades, sawyers,
boatmen, saises.
47. Tharoo ...A simple race, faithful in West and East Terai.
service

CLASS 3. *Objectionable.*

1. Acharuj ...Receivers of clothing of Upper Doab.
dead persons.
2. Aguregree ...Shop-keepers, litigious, ... East of Oudh.
3. Agurwala ...Traders, bankers, ... Do.
4. Bawureea ...Thieves and uncommonly Upper Doab.
dexterous ones.
5. Bhaireya ...Go about with dancing All districts.
women.
6. Bhudeyria ...Fortune tellers, low Brah- Do.
mins.
7. Bhudik ...Notorious dacoits formerly, Oudh and east of
now broken up. Do.
8. Bhugutteea ...Dancers, singers, buffoons, Agra.
9. Bhutteeara ...Keepers of Surais and All districts.
hucksters.
10. Bisatee ...Tradesmen, &c. ...Upper Doab.
11. Bisnor ...Money-lenders and if any Do.
seek service they are pro-
bably turned out of their
homes for cheating.
12. Bohra ... Do. Do. ... Do.
13. Borias ...Hereditary thieves, trained Doab Oudh.
to it.

- | | | |
|---------------|--|------------------------------|
| 14. Bumeea | ...Sometimes wax military, All districts.
cowardly, intriguing. | |
| 15. Buzina | ...Beggars and decoy ducks, Upper Doab. | |
| 16. Byragee | ...Mendicants, fit for nothing. All districts. | |
| 17. Chae | ...A peculiar class, clever impostors, swindlers. | Oudh & east of Oudh. |
| 18. Chookra | ...Akin to the domes, hangmen. | All districts. |
| 19. Dhadie | ...Musicians. | ... Do. |
| 20. Dhebi | ...Washermen and remain so | ... Do. |
| 21. Gotwaira | ...Petty traders | ... East Oudh. |
| 22. Kujra | ...Eunuchs | ... All districts. |
| 23. Kandoo | ...Grain dealers. | ... Do. |
| 24. Kayeth | ...Educated, not suitable for military service, apt to intrigue, the Gour Kyeth may be an exception, should never be enlisted. | Do. |
| 25. Koomra | ...Generally beggars | ... Upper Doab. |
| 26. Kohae | ...Oculists | ... Do. |
| 27. Kussah | ...Butchers | ... Do. |
| 28. Kusseyra | ...Petty shopkeepers | ... All districts. |
| 29. Kusumdhum | ...Money-lenders | ... Do. |
| 30. Meerasee | ...Musicians | ... Upper Doab. |
| 31. Mookeyree | ...Grain factors, general dealers. | All districts, east of Oudh. |
| 32. Nurbun | ...Generally swindlers, forgers, coiners. | Upper Doab. |
| 33. Nuh | ...Gipsies | ... All districts. |
| 34. Ootae | ...Buneahs | ... Oudh. |
| 35. Oodhia | ...Do. who go on expeditions calling themselves Brahmins, and return with plunder. | Central Doab. |
| 36. Peragwal | ...The most extortionate and rascally of Brahmins. | Allahabad district. |
| 37. Rujtojie | ...Traders, money-lenders, druggists. | Lower Doab. |

38. Sadh... Said to be emigrants from Oudh.
the Punjab and Cashmeer, Rohilkund, Oudh.
numerous in Furrukh-
abad districts, very bad
characters for cunning
and cowardice
39. Sanscea... Hereditary thieves, ... All districts.

H. T. OLDFIELD, MAJOR,
9th Bengal Cavalry.

V.

SKILLED MILITARY LABOUR IN INDIA.

At our Home and Foreign stations it is becoming more usual to employ military labour on Government works. The results are very favourable, and while it improves the physique, and is a boon to the men, the direct saving to the State is considerable. The Royal Engineers are the nucleus of these working parties, and assisted sometimes by artificers from the Line, furnish all the skilled labour; they provide foremen and the works are carried out under the direction and superintendence of Royal Engineer officers. The system is complete and wherever there is a company of Sappers (which contains artificers of many trades) supplemented by labourers from the Line, an organized body of men is ready to undertake any work which the State is likely to require.

It is a matter of regret that so little is done in India to save Government expenditure and to benefit the soldier, both European and native, by employing him on useful work. The climate is certainly against severe manual labor being performed by Europeans, but during many months of the year, it is not as bad as at some of our foreign stations. At Bermuda there are four companies of Royal Engineers, at Mauritius one company, at Malta two companies, St. Helena one company, at which places notwithstanding their tropical climates the Sappers work regularly at their trades.

Out of India it is now recognised that the State has a right to have military work executed by the troops, if it can be done cheaper by them than by civilian labour; but in India the full market value of the labour must be paid to them, and the State can in no way directly benefit by the employment of the troops.

I am far from thinking that military labour should be employed without proper remuneration, but the same principle that rules its employment in England should be in force in India, that is to say, that consideration should be given to the amount of military duty and drill which a soldier, either European or native, gets off when he is employed on a working party, and to the fact that he is in receipt of daily regimental pay independent of the amount he earns on the works.

When an Executive Engineer in India, I have frequently employed European soldiers both for skilled and unskilled labour. It was however always a private arrangement with the men, and they made their own bargain before commencing any work I gave them. If they did not complete it, I had no power to order them to do so; there was no co-operation on the part of the military authorities and the men got off no drill or duty on account of their employment.

I believe my experience will coincide with that of many Royal Engineer officers in India. We wished to employ soldiers, if we could do so, and not exceed our estimates for works (purely to benefit the

38. Sadli: ...Said to be emigrants from
the Punjab and Cashmere,
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abad districts, very bad
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H. T. OLDFIELD, MAJOR,
9th Bengal Cavalry.

V.

SKILLED MILITARY LABOUR IN INDIA.

At our Home and Foreign stations it is becoming more usual to employ military labour on Government works. The results are very favourable, and while it improves the physique, and is a boon to the men, the direct saving to the State is considerable. The Royal Engineers are the nucleus of these working parties, and assisted sometimes by artificers from the Line, furnish all the skilled labour; they provide foremen and the works are carried out under the direction and superintendence of Royal Engineer officers. The system is complete and wherever there is a company of Sappers (which contains artificers of many trades) supplemented by labourers from the Line, an organized body of men is ready to undertake any work which the State is likely to require.

It is a matter of regret that so little is done in India to save Government expenditure and to benefit the soldier, both European and native, by employing him on useful work. The climate is certainly against severe manual labor being performed by Europeans, but during many months of the year, it is not as bad as at some of our foreign stations. At Bermuda there are four companies of Royal Engineers, at Mauritius one company, at Malta two companies, St. Helena one company, at which places notwithstanding their tropical climates the Sappers work regularly at their trades.

Out of India it is now recognised that the State has a right to have military work executed by the troops, if it can be done cheaper by them than by civilian labour; but in India the full market value of the labour must be paid to them, and the State can in no way directly benefit by the employment of the troops.

I am far from thinking that military labour should be employed without proper remuneration, but the same principle that rules its employment in England should be in force in India, that is to say, that consideration should be given to the amount of military duty and drill which a soldier, either European or native, gets off when he is employed on a working party, and to the fact that he is in receipt of daily regimental pay independent of the amount he earns on the works.

When an Executive Engineer in India, I have frequently employed European soldiers both for skilled and unskilled labour. It was however always a private arrangement with the men, and they made their own bargain before commencing any work I gave them. If they did not complete it, I had no power to order them to do so; there was no co-operation on the part of the military authorities and the men got off no drill or duty on account of their employment.

I believe my experience will coincide with that of many Royal Engineer officers in India. We wished to employ soldiers, if we could do so, and not exceed our estimates for works (purely to benefit the

men), but when their employment involved extra trouble and expense, and was considered as a favour it was impossible to give them work.

The low rates of unskilled labour in India preclude the possibility of any economy in most cases being effected by the employment of Europeans, on work which can be done by coolies; at hill stations, where the climate is good and labour of every description dear and scarce, European labour ought to compete with native, but at all stations the men could make nearly the whole of the repairs to their own barracks.

Regiments at home and abroad whitewash their own barrack rooms, why should they not do so in India? It is very light labour, not involving exposure to the sun, and the men have already been accustomed to do it.

Where the barrack roofs are tiled, why should not the men repair and turn the tiles annually? It is very simple work, involving no hard labour. The pioneers of a regiment at home are employed as artificers about their barracks, what becomes of them when they go to India? As far as I am aware they are employed to look after the latrines, an employment which requires less skilled labour, than any other of which I can think; why cannot they repair the wood work and glass assisted by the other artificers in the regiment?

The above-repairs could surely be done by European soldiers without injury to their health; I should even go further and consider it a military duty for them to repair as far as possible the buildings they live in and the roads in their barracks. It will give them an interest which they have not at present, and save them from some of that dreadful ennui to which the soldier in India is so much exposed. It would prevent the introduction of low caste coolies (men and women) into barracks who bring disease and infection with them. There would be some difficulty at first in introducing this system into India, but it would be easy, as each regiment arrives from England, to make it continue the same to which it has been accustomed at home.

As regards the skilled labour of the soldier, it needs but a casual inspection of a soldiers' exhibition in India to perceive how much good work might be turned out by the Army, and also the high rates at which individuals value their own labour. The question seems to me to be this. Why this skill should lie dormant in India to the detriment of the Service, for no one can deny that enforced idleness is one of the greatest evils which befalls the soldier in India, and why the State should not benefit as it does elsewhere by the employment of its military artificers.

Regimental workshops are a step in the right direction, but at the best they are but amateur institutions, and until they are Government Workshops, which are supplied with materials by Government contracts, and which the men attend as a parade, and execute work in them for Government at fixed hourly rates, the work done in them will not be economical.

Referring only to men of the Royal Engineers, we send yearly out to India a number of them who are skilled artisans, carpenters, cabinet makers, painters, smiths, bricklayers, fitters, engine drivers, etc. I can testify to their superior skill, as it was my duty last year to try them at their trades previous to their being accepted as volunteers, and I could not help regretting that I should lose some of the best artificers in the R. E. Workshops at Chatham to send them out to India, where probably for several years their skill would be unused; and where it might remain for ever unappreciated. Only a few of these men were non-commissioned officers, and many of them did not possess the necessary qualifications for promotion; they were men of good character and superior skill at their trades; men accustomed to manual labour but not capable of taking charge of works and accounts. Their future in India will probably be this. At first when they join the Sappers and Miners they will have nothing to do except military duty. In the habit of being employed at their trades since they finished their course of recruit instruction at Chatham, they will feel the want of employment, and I can only hope they will not, as many have done before, take to drinking as a cure for ennui. The traditions of the Sappers and Miners point to the Public Works Department as the goal of a Sapper's ambition, and when he is appointed to it he immediately assumes civilian's garb—too many alas forget that they are soldiers. The Sapper in a few months becomes Corporal and Serjeant, and the most condign punishment which can overtake him is to send him back to the head quarters of his corps. When appointed to the Public Works Department the Sapper will probably be sent to superintend the construction of earth-works, in which he will not have had any experience, or to take charge of road repairs, when perhaps his previous work has only been in the smith's shop. He will have to keep complicated accounts which if he had had any aptitude for doing, would have ensured his being Pay Serjeant of his company long ago. Can it be wondered at, that there are so many failures among the Public Works Department European subordinates, and that frequently Executive Engineers are afraid to entrust work to them.

Now I maintain that these men's first duty is as soldiers, and that as they form a portion of the corps of Royal Engineers in India they ought not to be civilianized, and it is the duty of Engineer officers to see that they are qualified to undertake any work which in time of active service would be allotted to them as non-commissioned officers of the corps. The Sappers and Miners should not be so unattractive, both as regards pay and work, as to be regarded as a punishment serving with them, and when they are employed with them they should have useful and congenial work to do. Turning to the officers of the Royal Engineers, more especially to those of the junior grades, I find that the revenues of India have to pay 90 Captains and 198 Subalterns (viz. 9 Battalions for Indian service.) Most of these officers, indeed I may say all of them, look forward to civil employment in India. The pay is much better in the civil than in the Military Department, the prospects are more advantageous and nearly all prefer the work of the Public Works Department to the

less onerous military duty. It assimilates more to the duties of the Engineer officers at home and other foreign stations which their special education at Woolwich and Chatham is directed to qualify them to perform ; but it must be a matter of regret to the corps that their young officers in India should only have a couple of years military service and that while under instruction at Chatham. Their first duty is that of Military Engineers, they may be called upon at any time to perform this duty, and the great majority of junior officers, who in India will be available for military service, will positively have had no practical experience either with European or native Sappers. I think it is quite practicable to give further military duties to these junior officers, without interfering with their civil employment, and also to remove some of the objections which exist now in the employment of Sappers in the Public Works Department.

All the fortifications, barracks and other military works are built and repaired at home and abroad, under the superintendence of Royal Engineer Officers, assisted by military and civil subordinates. The Commanding Royal Engineer, who is in charge of a military district, is almost the exact counterpart of an Executive Engineer for Military Works in India, except that of necessity he must be an Engineer officer. The Commanding Royal Engineer may have one or more companies of Sappers quartered in his district, he does not personally command these companies, but being the senior Engineer officer gives orders respecting all matters connected with the men, leaving the details, returns and company arrangements to be done by the Officer Commanding it, who is under the orders of an assistant to the Commanding Royal Engineer.

It seems a very simple matter to extend this system to India, requiring only a company of Sappers to be stationed at each of the principal military stations, commanded by an Engineer Subaltern, and having several attached to it. The company would be under the orders of the Executive Engineer (ex officio) and would be at his disposal for carrying out Government work. The company officers, in addition to their military duties would be Assistant Engineers in the P. W. D and would learn their duties in the Executive Engineer's office, at the same time as they gained experience with native troops. The Assistant Engineers need only leave the company on promotion to the executive grade, which would give about five years' service with a native company of Sappers for a junior officer. There can scarcely be a doubt that this training at the head quarters of an Executive Engineer would be desirable for subalterns during the first few years of their service in India, and infinitely better than sending them away on some isolated duty, to pick up as best they can, the language, the modes of carrying on work, and the experience, which are necessary to make a good Public Works officer.

When the companies of Indian Sappers were sent to Abyssinia, a certain number of European non-commissioned officers were attached to them for duty. They were drawn from the P. W. Dept. or consisted of men from the head quarters of the Sappers and Miners ; most of them

remanded from the P. W. Department for not being a success in it ; They had no defined position in the companies to which they were attached : when the native Sappers paraded for work they were present, but they took no active part in superintending the men, and were rather an encumbrance than otherwise. As far as I know, the same system is now in force in India, and I shall be very glad to hear that there has been any improvement in it, and that I am now only describing a past state of things ; but my impression is, that if a company of native Sappers were required to-morrow for active service, it would be considered necessary to attach to it some European Sapper, who would be total strangers to the natives. If these men are to be of any use, they should be able to superintend working parties, no matter from what portion of the army, native or European, they may be drawn. I think that it is impossible to procure men from the Public Works Department, who can at once do this, for it requires great tact and management not to offend the native officers and non-commissioned officers, which the departmental training is not likely to foster. A company of Sappers should have its Europeans attached to it in peace time, and as they are in India there can be no difficulty in the matter if useful work can be provided for them during this period.

A company of Royal Engineers consists of a certain number of men of different trades, such as carpenters, smiths, bricklayers, painters, &c. &c. proportioned in such a manner that all work which may be required by Government can be undertaken, but a company of native Sappers is by no means the counterpart (as it ought to be) of a company of Royal Engineers. It may be the fault of the Engineer officers, in not paying sufficient attention to these companies, but it seems rather anomalous that the Europeans, both officers and men of the Engineers should be up to the usual standard, while the men with whom they have to work, have not the special training which is necessary for Sappers.

The European Sappers who are yearly sent out to India, are not all qualified to become non-commissioned officers, if they had exhibited any special aptitude for advancement they would have been promoted in the corps at home, and probably the majority of them would not have sought Indian service. The qualifications usually required by the Government of India are, that they should be men of good character and superior artificers. These qualifications are not the only ones necessary in a non-commissioned officer, and it is neither judicious nor tending to the advancement of the service, to promote indiscriminately every man of the corps who is sent out to India. The field for the Sapper is work at his trade, and as he must be a superior artificer, he is qualified to be a foreman or leading man, and to superintend soldiers, both European and native, of his own trade. It is in this manner, as foreman of his trade, that it will be advantageous to employ the European Sapper, and to employ him with his company of native Sappers on military works during peace time. I also advocate that wherever military artificers can be obtained, whether European or Native, that they should be employed in the Executive Engineer workshops, and under the supervision of Sappers.

If this system were carried out, the men of the Royal Engineers, who are now sent out to India, would find congenial work for which they have been specially trained. The State could afford to give them good pay as their labour would be reproductive, and the soldier would not be civilianized. They would soon get to know the men working under them, and would teach them the proper way of working and using their tools. The recent improvements in the English workshops would soon become known in India, through the native Sappers, for the recruits for the corps in England, have chiefly worked at large workshops in the principal towns, and they would convey their knowledge to the native Sappers. If a party were required by an Executive Engineer for any particular work, such as working an engine with machine saws, or a steam pump at the foundations of a bridge, it would be no small advantage to procure it from a company of Sappers, ready to commence work without any instruction being first necessary. This can be done in England, it can be done wherever a company of Royal Engineers is stationed, except in India, where the need is greatest and where civilian skilled labour is most difficult to procure. The men (Europeans) are the same in India as elsewhere, they possess all the requisite knowledge when they leave England, but it lies unused. They cannot of course undertake the same physical exertion in India as in England, but where the European Sapper's work leaves off the Native Sapper's should commence. I will not touch upon the enormous gain such a co-operation would have on active service, wherever and whenever it takes place skilled labour will be required, and the most valuable and economical will be that of soldier artificers.

When I was an Executive Engineer in India, I felt the great inconvenience in not having any steam power at my disposal; although labour is very cheap, cheaper almost than anywhere else in the civilized world, still, where it is required to concentrate power at one place, it can only be done by using steam engines. It is not complimentary to Indian engineers that steam power is universally used by Engineers except in the Public Works Department of India, and that it is left to Civil and Railway Engineers to introduce and use the most ordinary mechanical machinery. The impossibility of effecting even the most trifling repairs to engines and machinery in isolated districts, has hitherto been the great and insuperable difficulty to their introduction, but this no longer exists as year by year, Sappers who are fitters and engine drivers, are sent to India. These men have gone through a course of engine driving at the Royal Arsenal Woolwich, and hold certificates as practical drivers both of stationary and traction engines; they should instruct the native Sappers and train them to be competent firemen and fitters, so that wherever an engine and simple machinery were required, the men necessary for working and repairing them should be furnished from the Sappers and Miners.

I shall merely allude to the introduction of traction and portable engines of a proper description into India, introduced to suit the requirements of Executive Engineers who alone can undertake to employ them practically, and worked not in an amateur way, but by men who have

been specially trained to work and repair them. During the last two years I have had a considerable number of them under my supervision, driving machinery, as road engines, as locomotives, steam rollers and crane engines, exclusively worked with men of the Royal Engineers, and I am convinced that there is no practical difficulty to their introduction into India. Year by year the same plant as is used elsewhere on engineering operations will be gradually more and more introduced into India, and if the Royal Engineers are to hold the ground that they have up to the present so honourably retained on the Public Works in that country, it can only be done by availing themselves of all the means at their disposal. Great advantages are offered to the engineer in India by the employment of military artificers, advantages which tend both in peace time and in war, to economize the expenditure on military works.

T. J. WILLANS, CAPT., R. E.

Chittam, 2nd July 1874.

VI.

NOTES ON THE MILITARY TRIBES AND RACES OF THE
PUNJAB AND NORTH WESTERN FRONTIER.

THE following are the chief tribes and races who take service in our Punjab Regiments:—

SIKHS.

1. Malwaie.
2. Manjha.

DOGRAS.

1. Kangra and Hoshiarpour.
2. Jummoowals and Chibs.

PUNJABEE MAHOMEDANS.

1. Living south of the Salt Range.
2. Of the Salt Range, and to the North.

PATHANS.

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| 1. Hussunzaies. | 10. Zweimookht. |
| 2. Pukli-wals. | 11. Bungush. |
| 3. Huzara-wals. | 12. Khuttucks. |
| 4. Tunowlies. | 13. Bunnoochees. |
| 5. Mishwanies. | 14. Murwuttees. |
| 6. Lowland Eusofzies. | 15. Tribes of the Derajat, and |
| 7. Highland Eusofzies. | Suliman Range. |
| 8. Peshawuries and Momunds. | 16. Caubulees. |
| 9. Affreedies and Oorukzaies. | |

Sikhs.—The able and interesting paper on “the Sikhs as Soldiers for our Army” by Major Rice 1st Sikh Infantry, published in No. 12 of the United Service Institution Journal last November, leaves me little to say on this subject; so I shall only briefly notice them under the two headings as they are classified in our Regiments.

The Malwaie Sikhs.—The Malwaie Sikhs inhabit the country directly south of the Sutledge, comprising the British districts of Loodianah and Ferozepore, as well as the territories known as “the Cis Sutledge States.”

They are a tall manly race, much given to athletic exercises; thrifty and clean in their habits, amenable to strict discipline, generally the best behaved men in the regiment and steadiest on parade. But though good soldiers in the plains they are not so in hill warfare.

The Malwaies like our service and seldom leave it until entitled to their pension.

The Manjha Sikhs.—The Manjha Sikhs inhabit, as the name implies the district of the “Manjha,” though the term is now usually applied to all who inhabit the Punjab proper, that is Trans Sutledge. They are chiefly from the districts of Lahore, Umritsur, Goordaspore and Julundur.

The Manjhas are not so tall a race as the Malwaies, but sturdier and better able to bear fatigue, especially on a hill campaign, though in quarters they are less clean and well-behaved. They are much addicted to opium which causes them to be careless on parade and bad sentries; like the Malwaies, they are constant to the service, and rarely take their discharge until entitled to their pension.

Dogras.—The Dogras are the Rajpoot tribes inhabiting the lower ranges and valleys of the Himalayas, between the Jhelum and the Sutledge, including the British districts of Kangra and Hoshiarpore with Jummoo and the smaller independent Rajpoot states.

As a rule they are a slight race, both in physique and constitution, but have an exceedingly fine and martial spirit, which on service greatly compensates for their defects as soldiers.

In quarters like all Hindoos, the Dogras are scrupulously clean, and well behaved. They are thrifty to a fault, under feeding themselves to save money, and yet are always well clad.

They like our service and become much attached to their officers: in action they have proved themselves as brave and true, as any of the natives in our ranks.

Jummoo-wals.—In physique the westerly Dogras from about Jummoo are the finest, but belonging to independent territory are less desirable than those from our own districts.

The Chibs.—To the west of Jummoo among the hills of the district of Meerpore, Chowmook is a tribe of Mahomedan Dogras called Chibs. They style themselves "Mussulman Rajpoots," and were converted from Hindooism about the fifteenth century.

These make excellent soldiers without any of the caste prejudices of their Hindoo brethren, but being well off in their own country do not enlist in any numbers.

Punjabee Mahomedans.—The Punjabee Mahomedans form a large class in our Punjab regiments, and among them are included many castes and tribes living between the Sutledge and the Indus: but for all practical purposes a line drawn by the southern foot of the Salt Range divides them into two distinct classes of soldiers.

Living South of the Salt Range.—Those who live to the South of the Salt Range, and chiefly in the districts of Lahore, Sealkote and Goordaspore, may be described as a physically fine race and intelligent, but possessed of no martial spirit.

In quarters they are loose and slovenly, and much addicted to gambling, while on service they soon break down under fatigue and hardship.

There are of course exceptions to this rule, and I have known

many fine soldiers who have come from the districts of Shahpore and Meeanwallée, between the Jhelum and the Indus, especially the Towanahs, who make excellent Cavalry soldiers.

Of the Salt Range and to the North.—On the other hand the Punjabee Mahomedans of the Salt range, and country lying to the north of it, include some of the finest soldiers in our service. The Awans of the Salt Range and Pindee Ghēb, the Kutturs from Tatta-Doomél and Fettehjung, and the Gukkurs from the eastern parts of the Rawul Pindee district are a tall, sturdy and hardy people, but they should only be enlisted when young, otherwise they do not as a rule make intelligent soldiers.

These men are usually well off in their villages and seldom remain long in the service, generally taking their discharge after they have saved a little money. They are peculiarly litigious, constantly applying for leave to institute suits in their district courts.

In quarters they are well behaved, and on service can undergo any fatigue and hardship.

Pathans.—We now come to the Pathans, who form so large an element in some of our frontier regiments.

Though similar in language and customs their individual tribes have each distinct features and qualities, which contribute more or less towards constituting them good or bad soldiers.

Taking them as a whole they are undoubtedly a brave race, but impatient of strict discipline, slovenly and careless in their dress, unsteady on parade, much addicted to gambling, reckless in their expenditure, and free livers, consequently often deeply in debt. Unstinted hospitality also to their acquaintances and fellow-country-men greatly conduces to this.

Pathans are much attached to their country and homes, and will not remain for any length of time in the service, unless they can obtain lots of leave, or rapid promotion. They are quick and impulsive in their tempers, but with a little tact and judicious kindness can be easily managed.

On service and especially in hill warfare they are perfect as skirmishers, bold, active, and intelligent, but unless well led are apt to get out of hand; they will undergo any amount of hardship and fatigue, seldom knock up, and are capital foragers.

In describing them tribe by tribe, I shall commence from the north, gradually working down the Indus, and conclude with those from Cabul.

Hussunzaies.—To the north of the British district of Huzara and on the left bank of the Indus lies the range of high summits known as the "Black Mountain," inhabited by the Hussunzaies; the mountains

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on the right bank being inhabited by the Akazaies and Chagazaies ; these three tribes belong to the Eusofzaie family, but do not enlist much in our regiments, in fact, I have not known in my experience half a dozen who have done so. They are physically a fine race and brave, but as of late years they have been on bad terms with our Government it is not desirable that they should be enlisted.

Pukli-wals.—To the south-east of the Black Mountain lies the large open valley of Pukli, with the neighbouring district of Manserah ; the inhabitants of these parts call themselves Swatees, having been driven out of the valley of Swat and across the Indus by the immigration of the Eusofzaies, some four centuries ago.

They are a soft, unsoldierly race, without any martial spirit whatever, and are slovenly and dirty in quarters.

They come in great numbers to enlist in any regiment quartered in the north of the Punjab, but take their discharge directly it leaves those parts, or at any rate as soon as they have served three or four years.

Huzara-wals.—To the south of these and inhabiting chiefly the extensive plain lying between Abbottabad and Hussun Abdal, are the people calling themselves Huzara-wals from the name of their district.

These are a mixed race, speaking a mongrel Pushtoo, and though calling themselves Pathans are not considered to be so by those living, Trans-Indus.

They enlist considerably, and though a fine race to all appearances make but indifferent soldiers.

Tunnawalees—South of the Black Mountain and between the valley of Abbottabad and the Indus is the rugged country of Tunnawul.

The Tunnawalees are a branch of the Eusofzaies, they make excellent soldiers, yet never remain long in the service.

Mishwanies.—South of Tunnawul, and inhabiting the western slopes of the Mountain Range of Gundghur, is the small but hardy tribe of the Mishwanies.

They seldom enlist, but the few I have known in the service have been steady and good men.

Lowland Eusofzaies.—Having noticed the Pathan tribes on the left bank of Indus, we cross over to the right, and enter the extensive territory of the Eusofzaies, which is divided into two parts :—that of the Lowland Eusofzaies inhabiting the plain bounded on the south by the Cabul river, on the west by the Swat river, on the east by the Indus, and on the north by the mountains of Bonair, Swat and Bajour :—these latter mountains are inhabited by the Highland Eusofzaies.

The Lowlanders are British subjects, and are a brave but unruly race, requiring great tact and management. In quarters they are not

a well behaved set, extremely bigoted and addicted to gambling. I do not consider them a hardy race, though for spirit and actual fighting they are equal to the best Pathans. These enlist in great numbers, and generally stay in the service some 7 or 8 years.

Highland Eusofzaies.—Their brethren of Bonair and Bajour are a much finer and sturdier people, but the Swatees not so; in fact, inhabiting as they do an extensive valley, the latter can hardly be classed as hill men.

The Bonair-wals and Bajouries are tall, broad-chested men, fair-complexioned, very active and hardy, they make good and intelligent soldiers.

Since the Umbeyla campaign of 1863, there has been an order prohibiting the enlistment of these tribes, on account of their attachment to the Akhoond of Swat. Those who saw them fight on that occasion will admit that their courage is of the highest order.

Guddoons.—To the south east of Bonair stretching to the Indus is the mountain mass of the Mahabun, inhabited by the Guddoons and Khodo-kheyls, branches of the Eusofzaies. They make fair soldiers but do not enlist in any numbers.

Momunds and Peshawuries.—Next to the Eusofzaies come the Momunds, consisting of the Highlanders from the hills between Bajour and the Khybur, and the Lowlanders who have settled in Hushtnugger and the Peshawur valley.

The former are a thieving troublesome set, and never enlist in our service, but the latter do so extensively under the name of Peshawuries. They are generally good and intelligent men, and become attached to the service. All the Lowlanders are British subjects.

Affreedies.—From the snowy peaks of the Sufeid Koh eastward to the Indus runs a wedge-shaped mass of mountains, separating the large valleys of Jellalabad and Peshawur on the north from those of Meeranzaie and Kohat on the south; the western slopes of this mass (forming the base of the wedge) run down into the valley of the Koorum.

These mountains are inhabited by the numerous sections of the warlike tribe of the Affreedies, with the kindred one of the Oorukzaies who occupy the south west corner of the mass.

The Affreedies, although their dialect differs but little and in accent only I believe, from that of the neighbouring tribes, have a distinct physiognomy of their own, while the free, hardy, and quarrelsome life they lead among their craggy mountains forms them into a nation of soldiers.

In appearance they are middle-sized and broad-chested, with fair complexions, short spare beards, and generally a hungry wolfish expression of countenance.

They are quick tempered and impatient of discipline, and require very careful handling, for a tight hand on them without tact will soon drive all the Affreedies out of a regiment, while under a loose hand they will become a rabble. Some commandants object to them as being a troublesome lot, but those who have seen them on service can value them as trusty, fearless and intelligent soldiers, without their equals as skirmishers.

The Afreedies are divided into many sub-tribes and sections : the principal are the Adam Kheyl, the Kumber Kheyl, the Mullikdeen Kheyl and the Kookie Kheyl.

Adam Kheyl.—The Adam Kheyl inhabit the hills to the east of the Kohat pass, and are themselves sub-divided into the Gulla, Hussun Kheyl, Jeunkkie and Toorkie Afreedies.

Kumber Kheyl and Mullikdeen Kheyl.—The Kumber Kheyl and Mullikdeen Kheyl inhabit the higher slopes and valleys to the south east of the Sufeid Koh, which are drained by the Bara river and known as the district of Teera, the most considerable valley of which is Maidanee.

Kookie Kheyl.—The Kookie Kheyl inhabit the hills above the Khybur Pass, but they also have some settlements in Teera.

Besides the above are many smaller sections, such as the Meeshtee, Zukka Kheyl, Bussi Kheyl, &c.

Sheenwaries.—On the northern slopes of the Sufeid Koh, which run into the valley of Jullalabad, live the Sheenwaries, a tribe who often enlist under the name of Affreedie. They are a bigoted set and in my opinion are not to be compared to the true Affreedies as soldiers.

Oorukzaies.—The Oorukzaies inhabit chiefly the Sumana Range, and the valleys formed by its northern slopes, separating Teera from the Muranzaie.

They differ little from the Affreedies except in name, but do not enlist so freely in our service.

Bungush.—To the south of Affreedie and Oorukzaie hills lie the broad valleys of Kohat and Meeranzaie, inhabited by the Bungush tribe. The Bungush are British subjects and are now a quiet and peaceable race, though in former days they appear to have been able to hold their own against their more warlike neighbours, the Affreedies and Khuttucks to the north and south of them.

They are physically a fine race, darker complexioned than their hill neighbours, but I refrain from classing them as a good fighting or soldierly tribe.

They enlist freely, but find more favor in some regiments on the Bombay side, than in those of the Frontier Force.

Zweimookht.—In the north-west corner of the Meeranzaie valley, are some hills adjacent to the Sumana Range, among which dwell the tribe of the *Zweimookht* Affghans, some of whom occasionally take service and make very fair soldiers.

Khuttucks.—To the south of the Bungush lives the numerous tribe of the *Khuttucks* who inhabit a dry rugged hill tract, separating the Meeranzaie and Kohat valleys on the north from the extensive plains of Bunnoo on the south.

Their hills are bounded on the east by the Indus and on the west by the Wuzeries : their territory too runs up the right bank of the Indus as far as Attock, and then follows up the Caubul river as far west as Nowshera. The latter are generally known as the Akora *Khuttucks*. Those living directly south of the Bungush are divided into :—

I. The Teeree *Khuttucks* or those subject to the Khan of Teeree, (a feudatory of ours), and inhabiting chiefly the valleys of Lachee, Tee-ree and Baladur Kheyl together with Murree and its adjacent table lands.

II. The Sagree *Khuttucks* from the large village of Shukkurdurrah eastward under the chiefship of the Khan of Mukkud.

III. The Bungi Kheyl *Khuttucks* inhabiting a small but wild tract to the north-west of Kala Bagh.

The *Khuttucks* like the Bungush are our own subjects and form a large element in some of our Punjab regiments. They are a brave and sturdy race, and make very fair soldiers but are slovenly in their habits. Although they enlist in great numbers, they never stay any length of time in the service or in regiments stationed far from their homes.

Among them the Bungi Kheyl are considered the hardest and bravest, but the tribe is small and strongly attached to their wild craggy home, preferring the free life of pasturing their sheep and goats among their rocky mountains, and tilling their few acres of bajra, to the restraints of discipline and drill.

Bunnoochees.—To the south of the *Khuttuck* hills lies an extensive plain, bounded on the west by the Wuzerie mountains, on the east by a rocky range known as the Lowaghur or Maidanee Range, and on the south it is separated from the Derajat by a low ridge, whose culminating summit is Sheikh Boodeen the sanitarium of the Frontier.

This plain is permanently inhabited by the *Bunnoochees* in the north and the *Murwutties* in the south.

The *Bunnoochees* are a mongrel race without any soldierly qualities that I am aware of, though in former days quarrelsome enough among themselves.

Murwuttees.—The Murwuttees on the contrary are a fine sturdy people, and could they but be induced to take service in our ranks, would make capital soldiers, but they are apparently too well off in their villages to care about entering it.

Tribes of the Derajat and Suleiman Ranges.—From the southern border of Murwut down to Scinde lies the dry hot plain of the Derajat, bounded on the east by the Indus and on the west by the Suleiman range. The inhabitants are a mixture of Punjabees, Affghans and Beloochees. They never take service in the Infantry, but some do in the Cavalry, such as the Gundapoories and Mooltanies, and make excellent and brave soldiers. The semi-savage tribes of the Suleiman mountains, such as the Wuzceries, Suleiman Kheyls, Sheoranies, &c., never enlist in our regular service.

Caubulees.—Of the Caubulees who take service in our regiments the greatest number come from Koonur, a valley running to the north-east of Jallalabad, and from Loghur a valley to the south of the city of Caubul, while a few come from the neighbourhood of Kandahar.

As a rule they are first-rate soldiers, clean, intelligent and very amenable to discipline, making capital non-commissioned officers and coming nearer to our ideal of the European soldier, than any of the other natives in our ranks. They attach themselves very much to the service and generally remain many years in it.

I have thus endeavoured to notice briefly all the tribes and races who enlist in our Punjab regiments, but each of the above mentioned is worthy of a paper to itself.

H. W. PITCHER, CAPTAIN,

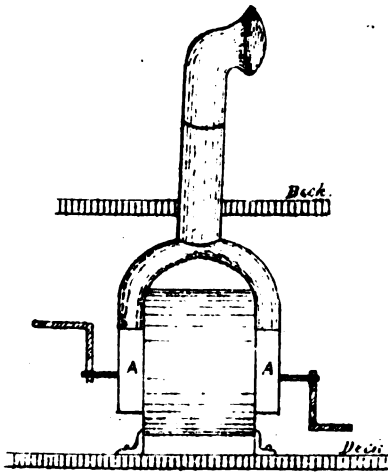
1st Punjab Infantry.

VII.

HOW A HORSE TRANSPORT SHIP SHOULD BE VENTILATED
AND REMARKS AS TO THE FITTINGS FOR THE SAME.

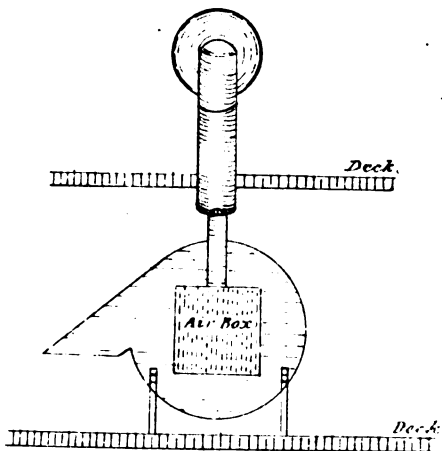
Having gone to Persia and Abyssinia with my regiment, in horse transports, I had an opportunity of seeing a great deal of the intense suffering of the horses, caused by bad air, bad ventilation, &c. &c. Being a great lover of the horse, and knowing that the welfare of my regiment depended on my landing the horses fit for service, their miserable state gave me great pain and anxiety which led me to think much of this subject : the following is the result which I trust may prove advantageous to Government and to those coming after me:—

A Horse Transport should have plenty of space between decks, at least seven (7) feet if possible. The ventilation much the same as at present, with as many funnels and windsails as possible. In each of these ships, to ensure a copious supply of fresh pure air, there should be two large centrifugal air-pumps or thermantidotes, one at either end of the ship, with the mouth pointing to the centre : these thermantidotes should be quite air tight, with no opening except the mouth, through which the fresh air would be expelled into the ship, and a funnel running up from boxes (A A) on each side, which would be led up on deck, above which its mouth should be about five (5) feet ; it should be a large funnel with a large mouth and revolving head, which could be turned to the wind at pleasure. These thermantidotes should be as large as possible, and the diameter of the fan wheels at least five (5) feet, which should be on the multiplying principle, the simpler the better, and



made so as not to be likely to get out of repair ; they should be calculated to be worked by two men each, or in a steamer by some apparatus which could be connected with the machinery. By the above means the fan wheel in the thermantidotes creating a vacuum when working, the pure air would rush in through the funnel, supplying the place of the air expelled, the fresh air introduced between decks would expel the heated impure air upwards, and would be the means of keeping an ample supply of fresh air below, which would keep the horses perfectly comfortable and healthy, nearly as much so as if they were in their own stables on shore. The thermantidotes could be made either of wood or sheet iron, whichever was found cheaper in manufacture.

I may here observe that the mouth of the thermantidote should come down low, to within two (2) feet of the deck, the upper part of the mouth protruding so as to ensure the air going downwards along the deck. By means of canvas hoses expanded by hoops the fresh air could be conveyed to any required spot.

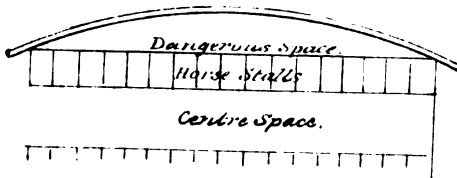


Cost.—Two of these thermantidotes should not cost more or as much as the price of one horse, whereas from want of proper ventilation from ten (10) to fifteen (15) horses die on one voyage, and the rest are nearly unserviceable on landing, and many horses' constitutions are injured for life, and glanders engendered in the regiment.

Though my chief object in writing this paper is the preservation of horses, I would suggest that troop ships to the east of Suez should be supplied with thermantidotes as above described, which without doubt in the hot weather, in the Red Sea, would be most advantageous and beneficial to the troops and their health between decks.

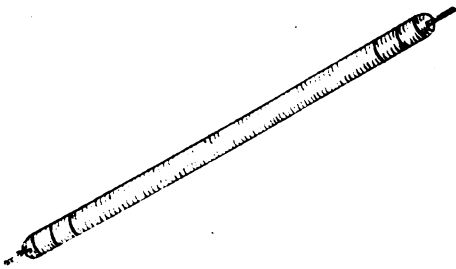
Fittings.—With regard to these the fittings I have seen in horse ships, in both the campaigns to Persia and to Abyssinia, have been

extremely bad, not nearly strong enough, and in some respects dangerous to the horses. The front posts of the stalls are fixed in straight lines up the centre of the ship, instead of following the shape of the side of the ship and keeping equi-distant from the sides. The bales were all made the same length, so could not reach the side of the ship, as the distance became greater from the head posts as it got toward the centre of the ship; to rectify this a rail and boarding was brought out to meet the bales, leaving a space between the supporting rail and the side of the ship. Horses kicked over this and got their hind legs caught between the rail and the ship, and had to be lifted out by men (a most dangerous operation.) The horses broke their legs or were seriously injured, and rendered unfit for some time at least.



The stalls should be made of the usual depth from the side, and the bales fitted to the side of the ship; this would leave a slightly circular front to each rank, and leave more room in the centre of the ship.

Bales.—The bales instead of being squared timber, fitting into squared apertures made for the purpose, and thereby rendered immovable, should be perfectly round bars revolving on strong iron pins, of at least an inch in diameter, running up both ends of the bar, at least nine (9) inches inside, the bar being banded with iron in two or three places to prevent splitting. Violent horses get their hips under the square bales, frequently break the bales and always knock the tops of their hips off, making a very disfiguring wound and one very difficult



to heal, whereas the round bar as I describe, moving on its own axle, would turn round on pressure, and consequently neither hurt the horse nor break.

Loose Boxes.—There should be two loose boxes, boarded off on each side to prevent the horse slipping under the feet of adjacent horses; they should be, one on each side of the main hatch as the coolest place, they are very necessary for sick horses since it is found that a horse being able to lie down in the cool rapidly recovers.

Disinfectants.—Chloride of lime, at present used for disinfecting purposes, has such an overpowering and sickening odour itself that in a confined space like the between decks of ships, the cure is nearly as bad as the disease; I much prefer MacDougall's disinfecting powder, or MacDougall's or Burnett's disinfecting fluid, either of these fluids mixed with the water used to wash down the horse decks would remove the ammonia without leaving the disagreeable smell that chloride of lime does.

Illnesses.—Madness of horses on board ship, &c., &c.

The Horse only breathes through his nostrils, the lining membrane of which extends nearly to the brain, and is of a most delicate texture, full of veins and consequently most sensitive in feeling bad effects from any impure or pungent air. In badly ventilated ships, the impure air strongly impregnated with ammonia from the urine, greatly irritates and causes inflammation of the lining membrane of the nostrils, which through the blood-vessels and veins is carried to the brain, and drives the horse savagely mad, on which occasions no one dares approach him; he tears the bars out with his teeth, and smashes everything he can reach, not sparing himself.

Remedy.—The only remedy for this is to have ten or twelve men ready with buckets full of cold salt-water, and douse him well over head and body as quickly as possible: this will calm the horse for a few minutes, when advantage must be taken at once to remove him from his stall, and place him under a hatchway where he can breathe fresh air; he should be kept there half an hour or so, with a jhool over him, and then put in a stall near the hatch-way, the only place in badly ventilated ships in which horses can get anything like fresh air to breathe.

Port Holes.—Some ships are provided with port-holes, some with scuttles, which in fine weather can be kept open and are of great advantage in ventilation: but these port holes are generally about the height of a horse's back, and horses between decks are almost always in a state of profuse perspiration, in which state an occasional strong breeze coming in through these ports from either one side or the other, strikes on the horse's loins, giving him "stroke of the wind" or "Kumaree"; and I have seen horses drop down in their stalls paralysed from it, and have had on occasions to drag a horse from his stall along the deck to the hatch-way, when I applied a strong mustard poultice

to his loins, and a skin stripped hot from a sheep fastened well over loins and croup; the horse was then well jhooled up, and a pint of linseed oil administered, and left alone with plenty of bedding under him. After a day or so the horse got up and was perfectly well, and in good condition on arrival at port. I believe this to be the best treatment on such occasions.

The madness referred to, and injury from open ports, would be obviated by the free supply of a current of fresh air as proposed.

Under the present system, on the termination of a voyage, horses are totally unfit for service for a long time after landing, whereas should my suggestion be adopted, I feel confident that not only would the mortality among the horses be greatly diminished, but the whole, being comfortable and free from fretting, would retain their condition and land fit for immediate service.

J. C. GRAVES, COLONEL, C. B.,

Commandant 3rd Bombay Light Cavalry,

NEEMUCH, 20th July 1874.

VIII.

REGIMENTAL LIBRARIES.

Technical education is in these days more general, and more strongly insisted upon in the Army than it ever has been before, and in future a soldier will be nearly valueless if he does not study his profession theoretically as well as practically. That this profession is a science which requires much application to learn satisfactorily has been recognized from time immemorial, and especially inculcated by the Duke of Wellington and Napoleon, but in their day it was not usual for officers to study the art of war very closely, and the few who gave themselves up to it were generally the marked exceptions who rose to high commands and to fame. In those days too, junior officers did not occupy very responsible positions. Almost all movements were carried out under the immediate direction of the seniors, and company officers had simply to go where they were told without thinking much for themselves. But times are changed, and we must also change with them. It is generally conceded that in present warfare it is no longer possible for the senior to exercise the superintendence which they have done, and much will depend on the manner in which captains and other company officers handle their men. Hence the necessity for more general professional study throughout the army. Besides this, both officers and men in foreign armies are more highly educated than they used to be, and if we would keep our place, it is imperative that we too should look upon the army as something more than a means of gaining a home, an occupation for a few years and a small annual stipend, which I fancy is the view which many officers have hitherto taken of their profession. Opportunities for practical study are naturally few, and it is therefore the more important that times of peace should be devoted to learning the theory of war and all matters connected with an army. One method of acquiring this knowledge is to read carefully the experiences of others, and these are so varied, and so many books are now-a-days written on the subject, that very few men could afford to purchase all the works that are published, to say nothing of the enormous increase there would be in baggage, if every officer were to convey such a library about with him. (Lieutenant Colonel Home in his "*Précis of Modern Tactics*" quotes from no fewer than 86 military works and essays).

These difficulties would be obviated, if every regiment possessed a military library. Such a library should contain all the best standard works on the subject of war, besides atlases, maps, works on surveying, fortification, etc. Government might possibly assist in the formation of such institutions by presents of works, etc., already published, and the libraries would be maintained, and new works added, from a fund obtained by a yearly subscription of one or two pounds from each officer using them. There would be, I think, but few non-subscribers in a regiment. The fund thus provided would also defray the carriage of the property from station to station on the ordinary movements of a regiment.

It would be a good thing, if there were garrison military libraries in all large stations to which officers could have access, either gratis or on payment of a small monthly subscription. I believe Garrison Instructors in India have charge of small libraries, but whether these are intended only for the students in garrison classes, or for the use of officers in general I do not know. If the former, they are not of much good, as what with work in the field and in the lecture hall, students have but little time to spare for any reading save that of their text books. Good garrison libraries would by no means obviate the necessity of regimental ones, as battalions are frequently alone in small stations or send out detachments from large ones, and in either of these cases privates libraries would be a great resource. Many regiments possess collections of books of fictions, etc., but these are not nearly so indispensable as military works, since almost every station in India, no matter how small, possesses a library of general literature in which however novels predominate and professional works of any sort are very scarce.

In England, military libraries would not be so essential as they are in India and the colonies, as many regiments subscribe to large circulating libraries from which works of every description can be obtained as soon as they are published. Facilities of this sort do not exist abroad, but even at home it would be better that a regiment should possess books of its own, which officers could always read leisurely as they felt inclined.

It must not be thought that the object of regimental libraries is to relieve officers of the necessity of keeping any books except those required by regulation. There are certain small and handy books which every one should have in his possession, such as Lieutenant Colonel Home's "Précis of Modern Tactics" but books of this description only contain extracts from noted authors, and many officers would be glad to study in their leisure hours the works of these authors at full length. This the regimental library would enable them to do at small cost and with no increase to personal baggage.

The books kept by a regiment would be of use for other purposes than those of ordinary perusal, officers studying for the Staff College or other examination, would probably be able to obtain from them, works of reference which otherwise they would be at the expense of buying for themselves. Others wishing to lecture would find materials from which to compile their addresses, and books no longer required by officers might be lent to non-commissioned officers and men who cared to read them.

The plan which I have sketched out, seems to me to be as cheap as one as any for supplying a want which is much felt in the Army. There can be no doubt that in these days officers should read and know something more than their drill books, and though it is obvious that £2, expended annually by only one person would not provide many first rate professional books, a yearly contribution of £60 from 30 officers would soon place a regiment in possession of a very good military library.

This scheme would, I fear, be hardly feasible for native regiments, as in them there are so few British officers that the libraries would either need be very small, or the subscription rather large. This however would be a matter for their own consideration, and if there were garrison libraries they would benefit more than any one by them.

C. DUTTON, *Captain,*

85th Light Infantry.

NOTICE.

THE Durand Medal for 1874 has been awarded to Captain James Colquhoun, R. A., for his Essay on "An Intelligence and Topographical Department best calculated to meet the requirements of an Army in India." This Essay will be published in an early number of the Journal.

The subject for next year's Essay will shortly be announced.

Members of the Institution who have not already done so, are earnestly requested to pay their arrears of donation and subscription, either to the Corresponding Members at their stations, or direct to the Secretary at Simla.

Some members still owe their donation and three years' subscription.

Officers, who may wish to become members are requested to be kind enough to forward their donations and subscriptions at the same time as they express a wish to join the Institution, and also to inform the Secretary whether their subscription is intended to be for the current year which ends on the 31st May 1875.

Members can pay their subscriptions to the Alliance Bank, Simla, if more convenient, and the Bank will grant receipts for any money sent.

The entrance fee is 5 rupees and the annual subscription 5 rupees.

Members on changing their addresses are particularly requested to notify the change to the Secretary, in order that delay in forwarding the Journals may be avoided as much as possible.

The address book is corrected up to date from the Army Lists, but mistakes are occasionally unavoidable unless members themselves promptly notify their change of residence.

Members proceeding to England on leave, who wish the Journal to be forwarded to them while absent from India, should inform the Secretary, and send stamps for the overland postage by Brindisi or Southampton as they may desire.

When a member appears in orders for leave to England, his Journal is not despatched unless he asks for it, and while absent from India his subscription is not payable unless the Journal is supplied.

Members on return from furlough can obtain the numbers of the Journal that have been published during their absence by paying the subscription for that period, and all members on returning to India should inform the Secretary of the fact at once.

H. H. STANSFELD, LIEUT.-COLONEL, *Secretary.*

ORIGINAL PAPERS.

I.

"INFANTRY TACTICS."

(*A sequel to Major-General the Hon'ble Fred. Thesiger's Instructions at the Roorkee Camp of Exercise 1873.*)

THE DEFENCE.

WE have seen by what has preceded, how Major-General Thesiger adapts the normal formation of an English Battalion of eight or six companies, (the latter strength that of Native Regiments leaving two instead of 4 companies as main body), for the attack or offensive.

In order that he should derive the full benefit of the modern ideas and modifications, introduced recently into nearly all important foreign armies, as absolutely required by the effectiveness of modern Artillery and Infantry fire, no officer should neglect to complete his instructions by the closest study of Major W. von Scherff's studies in the new Tactics of Infantry, upon which Major-General Thesiger has based his system of attack for a battalion of English infantry.

The following pages on the Defence can also only claim to be a mere epitome of the Major's system, and is briefly rendered to complete the subject ; for if one is shewn how and when and where to attack, it is also necessary to have some corresponding system of defence.

It must be here repeated, the broad principles of our Field Exercises are susceptible of being duly maintained to meet even the exigencies of the present day.

Arbitrary additions, or *existing evolutions* which do not adapt themselves to the end in view, modifications of no practical utility, tend not only more and more, to separate the training of the soldier according to the Field Exercises, from what is practically required of him in the field, but these also create inevitable confusion in the minds of both officers and men by the *absence* of that train of thought and methodical chain of instruction, which should impress upon all that, if the foundation of all training should be found in the *Field Exercises*, these should be but the stepping stone to the action of masses in extended order. In one word, that when once the soldier escapes the

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trammels of formal drill, he should not be lost when called upon to exert himself individually, and that yet this freedom should be influenced by that methodical instruction so necessary for troops.

The training of the Battalion, of the Company, should alternate from the school drill on parade ground to the field of application, and on no account should the groove of established Regulations be departed from in a greater measure, than in adapting them to the actual demands of modern conflict. To do this, as Major-General Thesiger has shewn, scarcely any change is required, but, on the contrary, more method and discipline.

Without altering the precepts or maxims which the experience of years has sanctioned as guides, if our new armaments require modifications, indispensable changes, it will be discovered by those who reason closely, that these consist in a stricter study and arrangement of details and parts, in a more methodical division of labour for those parts, while each has a definite and well-assigned function.

In fact we are, without disclaiming theory, becoming more practical and workmanlike day by day. To be successful now, the work must be complete in every sense of the word. Thus we see the Germans and other nations instructed by their example, assigning to

1st. Cavalry the business of exploration and scouting.

2nd. To the advanced guard the entire duties of security, duties which on being halted and forming a line of outposts would still devolve upon it.

3rd. To the "main body" of the advanced guard, while supporting the van, as the latter support the Cavalry in its operations, is assigned the task of "*introduction*" to battle, by a demonstrative action; decisive measures being as much as possible interdicted to this body. In other words it is the "*Aufmarsch*" of the Germans, or that operation by which the order of march leads to the *rendezvous order or concentration* without definite, but with ulterior views.

4th. Next under cover of such advanced guard in *rendezvous order* the "Artillery" is thrown forward to search the key note of the situation, and at this stage the "*Entwicklung*" or "*Tactical deployment*" or development of the main body of the troops into order of battle, occurs under the fire of massed Artillery. In the present day all these steps, all this fractioning of the whole with an assigned duty for each part indicates clearly the process by which a battle is brought about, and by leaving as little as possible to the unknown and to the element of chance.

The whole machinery of an Army has been perfected by improved mechanism and to each perfected element of power, with distinct functions, it has been necessary to apply new names for the sake of clearness

and distinction. In these the work of Major von Scherff abounds, and for the intelligence of the subject they are indispensable ; nor is one surprised on learning that the late experimental tactics of the Prussian Guard at Berlin on Major von Scherff's system should have proved successful and are likely to be adopted by the military powers of Europe.

Major von Scherff having brought the mass of troops to occupy a tactical deployment out of reach of Artillery fire, on the formation of the advanced guard, by the above four processes, designates them under the general term of the opening of the fight (*Einleitung des Gefechts* or *Angriff*).

The *Cavalry* arm having been called upon principally for *exploration*, the *advanced guard* for *security and introduction*, and the *Artillery* for the *tactical deployment* ; it is now that Infantry comes into play by different stages, which Major von Scherff describes as—1. *Preparatory stage of attack*. 2. The stage of execution. 3. The stage of attack or onslaught.

Omitting details Major-General Thesiger has dealt with the arrangement or formation which an English battalion can adopt for the attack.

In treating as follows for a Battalion on the defensive a similar brevity will be observed without defining more particularly the different stages of resistance, counter-attack (offensive defensive) fully described by Major von Scherff, omitting also his valuable notice of the temporising combat.

There can be in this case equally no difficulty in disposing the English Battalion on the defensive, corresponding to Major-General Thesiger's arrangement for the offensive or attack.

A Battalion entrusted with the defence of a position, or military point opens fire under every advantage of preparation known, range, time and shelter from the halt as well as flanking fire, and is successively made aware by the adversary himself as to the most favourable opportunities for that fire being continued and intense.

It is true, mere fire will not discourage an enemy, or at least he must not reckon upon this as a certainty, and therefore other means of counteracting his aims should be adopted. They are those of a nature which actively undertaken by small detachments would disturb the plan of an attack from its very first preliminaries.

We have therefore to think (1) of disconcerting and detaining the enemy ; (2) the stage of passive resistance by the studied fire effect ; (3) the time when a counter-attack can be carried out with the greatest vigour must be taken into consideration.

Thus we have two tasks on the defensive (1) the one which concerns the *passive resistance* or favourable occupation of the ground and bringing a heavy fire on the enemy ; (2) we have to *operate offensively*.

To unite these two conditions of a proper defence we have first to post one battalion on the ground itself.

Defensive Body.—Therefore corresponding to Major General Thesiger's *Advanced Body*, our *Defensive Body* will also consist of two companies in extended order, covering the normal front of the battalion under the command of a Major.

Supports.—Two companies in line placed on in rear of each flank of the *Defensive Body*, or both in echelon on the outer flank of the Battalion itself, a flank one on the brigade, ready to meet any attack there, and according to ground in rear of the front line of defence. These supports when separate under command of their own Captains, when united under command of a Major.

Main Body.—Four companies in line will form the main body with half a company interval according to ground between each, and at 4 to 500 paces in rear of the defensive body.

Such being the normal formation, and certainly it differs only in name from the old established lines of skirmishers, support and reserve.

A little reflection will naturally suggest that the nature of the ground and existing localities (Order) so occupied by the defence must in a great measure modify the disposition of the three bodies, as well as of their fractions. The attacking forward movement has no such latitude, for once developed, cover is secondary to the advance, and the assailant must give his impact in the least possible time and trust to superior firing power in one direction.

The general characteristics of the defensive combat, besides the utilization of natural cover and shelter trenches must not however be lost sight of, viz., Powerful delivery of fire to (1) retard the assailant. (2) To disconcert his action at the different stages of attack. For this :

The defensive body (skirmishers) consisting of two companies need not at first deliver their fire, but sending forward to some 500 yards of the defensive line, few groups of marksmen or even sections, these taking advantage of the natural cover, endeavour to disturb the preparations of attack at the longest ranges, and as the enemy advances keep him under a continuous dropping fire from the very first, provoking him to anticipate the final rush and to deceive him as to the time and place where he would determine to develop such an intention.

This line of groups for which we can find no better term than the sharp shooting line, opens its fire at measured long ranges and encreases its intensity as the assailant advances, but while giving ground and retiring step by step, they clear the front when the enemy has reached the 400 yards distance from the position. Resuming the places reserved for them in the line of the *Defensive Body*.

Perhaps it were better if the sharpshooters were furnished by the supports, the Defensive Body being kept undisturbed on the actual line of serious resistance.

At the moment of the threatened rush the aimed fire of the front line is most intense and sustained.

Should the assailant, reinforced by his supports, continue to advance, the supports of the Defence will equally reinforce the Defensive body, and even bayonetting any of the enemy's groups that might have succeeded in breaking through.

The enemy, reinforced by his main body, if he has been successful up to this, will attempt the final rush, and it is to counteract this, that the main body of the defence will be called upon to act.

In the first case it can bodily reinforce the first line at the points most needed ; in the second it can effect a flank movement on one or both flanks ; in the third it can, while reinforcing to the front detach a portion to act on one flank of the enemy at a time when he is exposed to the most serious and annihilating fire of the Defence.

The two latter plans if properly timed, are by far the most preferable, and especially available in broken ground, without detaching more than one company from the Main Body of the Defence.

But both the instances of the attack and defence, which have been under consideration in these sketches, imply the case of decisive action on both sides.

Nevertheless it will frequently happen in war, that a decisive action is not desired, especially when by gaining time it is wished to deceive or mislead the adversary.

If the assailant has the means of simulating a false attack, it can be met by the defence with equal facility, by simulating a defensive action, and with better means of concealment. Any day, an isolated battalion or detachment may be called upon to act demonstratively in either the one or the other case, by being placed, for instance, at a point in the Field of Battle facing an enemy, where the real attack, the real defence, is not intended. In such cases a battalion need be only thrown into the well practised lines of skirmishers, supports and reserve, which gives a latitude of movement not admitted for the strictly defensive combat, inasmuch as the latter, in regard to time, place and fire, is entirely subordinate to the well defined stages of a serious attack.

ISKENDER.

II.

NOTES ON RECRUITING FOR THE NATIVE ARMY.

THE great importance of obtaining good recruits, now regiments are limited to a strength of 600 sepoys is obvious. On a regiment being ordered on service, the sickly men are left behind, also recruits, and there are generally a number absent on furlough, so that the deficiency in strength of regiments has to be made up to a certain extent by the best recruits obtainable being enlisted.

If a regiment is ordered to supply itself with mules or ponies, a European officer is detailed for the duty, and every endeavour to obtain good animals is made, assistance being obtained from the civil authorities, &c., but should recruits be required, either a native officer, non-commissioned officer or sepoy (a native of the district in which he is to recruit) is told off, who often begins by bringing up men from his own village, perhaps his nephew or relation, and takes care to spend as many days as he possibly can spare from recruiting duty, in his own home.

Should a native officer happen to be on furlough and in charge of a recruiting party, he naturally, considering himself on furlough does not work overhard, and leaves the trouble of visiting villages, fairs, &c., at any distance from his home to the sepoys, who knowing the Subadar will get any credit there may be allowed on return to regimental head quarters do not exert themselves over much.

The impossibility of the officer commanding the regiment knowing what they are about, leaves them quite at ease, and they prolong their absence from the regiment as much as possible.

Should this account be not overdrawn, the advisability of despatching a European officer as often as possible is apparent, the routine duties which he would perform at regimental head quarters not being nearly of such importance as the recruiting duty, and could be performed by another as a regimental arrangement, Government being put to no expense, it being for the benefit of the corps.

The British officer on arriving in the district (if possible in the cold season) calls on the civil authorities, looks at a map of the district and despatches his men in directions where the best recruits are obtainable, avoiding the low lying villages, where fever prevails. Also he himself visits fairs and villages, and in this way comes into closer contact with his men, gets a better knowledge of their castes, customs, &c., in one month than he would in a year at head quarters of the regiment.

The orders of the Government and Standing Orders of regiments, as to castes of recruits to be enlisted, are evaded every day by men giving themselves out as belonging to the caste ordered to be enlisted, and it is only discovered a year or two afterwards perhaps, by his having two names, one known to his comrades and the other to the Adjutant.

There are so many advantages to regiments in recruiting through a British Officer over the system at present obtaining in the Native Army, that it would well repay Government to grant a free passage by rail at public expense to every British officer proceeding on recruiting duty, also an allowance of Rs. 50 per mensem for Dak Bangalow and travelling expenses, visiting fairs, &c.

The number of recruits taken from their villages to the nearest cantonment and rejected by Medical officers would be diminished and disbursements of subsistence allowance should be made in presence of the officer.

Recruiting, that is the obtaining of the best class of recruits is more difficult than formerly for many reasons, and the amount of marching from village to village and to and fro, from nearest cantonment is very great. The papers on "Dogras," Goorkhas," etc., lately issued from the Adjutant General's Office give information as to habits, customs, etc., but the best opportunity an officer has of practically gaining a good knowledge of his men, is when in charge of a Recruiting Party, and it is to be regretted that the present orders of Government do so little to induce officers to volunteer for Recruiting Duty, especially if regiments ever have to be raised as in 1857, when a good knowledge of the different classes which form the Native Army obtained in the district and villages from which they come would be of some value to Government.

G. YOUNG, CAPTAIN,
1st Goorkhas.

III.

MUSKETRY INSTRUCTION OF THE BRITISH ARMY.

It is now nearly twenty years since a regular system of Musketry Instruction was introduced into the British Army. The Annual Reports from Hythe show what an enormous advance in shooting has been made during these years; and, although this is doubtless, partly owing to improved weapons, it is also in great measure attributable to improved instruction and increased interest on the part of men and officers. The new system met with considerable opposition from soldiers of the old school; but although no great pains were taken to render the change popular, and a perhaps unnecessarily complicated series of returns was called for, Musketry Instruction has held its own, and it is now a rare thing to hear any one question its utility.

Facts speak for themselves; and it is impossible for any one who looks at the present shooting of the Army to dispute the good results of the present method of teaching.

I think, however, that it has become a question for consideration whether our present state of efficiency in the use of the rifle does not exist too much *upon paper*; and whether the time has not arrived for teaching our soldiers to be more practical shots, ready to use their weapons with good effect at any time and under any conditions.

As the subject is one to which I have given much consideration, and as I have also had opportunities of conversing with experienced officers of many regiments, I have formed a very strong opinion on the subject, and I venture to give my views in this paper, hoping, that it may attract the attention of officers in general, and especially of those in whose power it may be to work the change, should they consider it advisable.

I will divide the paper into two parts.

1st.—What I consider the weak points of the present system.

2nd.—The system that I would substitute.

 PART I.

It is clearly laid down by the highest authority that shooting is one of the most important parts of an Infantry soldier's duty, and that the object of all drill and manœuvre is merely to place him in the best position to use his arms with effect. This being the case, it stands to reason that Musketry and other drill should be inseparable, and that what is taught at Musketry should be carried out on the parade ground.

The theory is admitted, but how is it carried out in practice?

I think that few will contradict me when I state that in most regiments it is the exception to see a manœuvre followed by firing. A battalion may be at drill for an hour without firing a shot: the men might almost as well leave their rifles in their barrack-rooms, only to be taken out when they go to position drill. On the few occasions when firing does take place, as at Brigade days, &c., when blank cartridge is probably issued, the loose method of firing frequently does more harm than good. Men fire without aim, and without having any command over their rifles, and in awkward positions which they would never think of adopting on a Rifle Range.

It is not even a rare thing to see a skirmisher letting off his rifle in the air, as he walks along, and yet such absurdities are seldom taken notice of.

I admit that there has recently been *some* improvement in this respect, and that men skirmish in a more intelligent way than formerly, but much is still wanting. It may be said, that if men are properly taught at musketry, they will carry out what they have learned, and that the parade ground is not the proper place to correct such minor errors. I contend however, that the principal blame is to be attached to the system which separates instruction in the use of arms from instruction in other drill. I know that it is not an uncommon thing for an Adjutant to say that Musketry is not *his* business, while it too often occurs that a Musketry Instructor forgets all his other drill, and that it is about as much as he can do to march past with his company at the Annual Inspection.

Not only is Musketry made a separate department, but there is a separate season set apart for practice. It may sometimes be necessary that the shooting of a battalion should be got through within a certain time, but I cannot see how good can result from the arrangement of keeping a company at Musketry for twelve consecutive days in the year, and then never giving the men another shot to fire.

How would it answer, if a battalion was drilled for a fortnight, and never had a regimental parade again till the following year?

Could the battalion be as smart and efficient as one that had occasional parades?

At present, before a company fires a shot, it has to undergo four days of preliminary drill, and in some regiments, where unusual interest is taken in the shooting, the men get six or even eight days' drill.

The result is that the men are wound up to concert pitch, and when they go to the range they shoot under the most favorable circumstances.

No one is allowed to talk on the range; every care is taken that the men's attention is not distracted; and every possible assistance is given to them; all this is admirable for the purpose of instruction, but do we not want something more?

Having once thoroughly instructed the man, I think, we ought to make him carry what he has learned into practice, under various conditions, as nearly as possible, such as he would meet with on service.

During the time that the company is at drill and practice the men are struck off all other duties; good shots are probably excused from a good many drills, so until the practice commences they have hardly anything to do.

Twelve days of *continuous* Musketry is enough to tire most men, however fond they may be of their work; but still, I believe that it would all be done cheerfully if the course was confined to drill and target practice. But after the shooting is over, and officers and non-commissioned officers have been many hours on the range and are thoroughly tired, the company has again to parade for Judging Distance Practice.

In theory, Judging Distance is most essential: without a certain knowledge of distances the marksman cannot develop the full powers of his weapon; and every soldier ought to be taught to have a *general* idea of distances.

Beyond this I do not believe that Judging Distance can be taught, and I am firmly convinced that the time spent in endeavouring to teach it might be much better employed. With the present low trajectory rifles, accurate judging distance at short ranges is not necessary; and at long ranges a trial shot or two will give more information than the best and most practised Judge of Distance.

As to the way in which the practice is carried on, I am of opinion that it is generally utterly useless.

In the first place, men generally have a very good idea which class they are judging in, and when so much is known, with only a margin of from 200 to 300 yards, it is not difficult to make approximate *guesses* which will generally obtain the necessary number of points. Again, men *will* consult; it is quite impossible to prevent it, and consequently the answers are no test of the men's real capabilities.

In short, as far as my experience goes, the Judging Distance Practice Registers of a regiment, are, as a rule, a waste of paper, ink, and time.

I think that recruits ought to be thoroughly taught in the first instance; and that the men's knowledge of distances can be afterwards sufficiently well kept up for all practical purposes, by observing the markers at the different ranges when at Target Practice, and by occasional practice at unknown distances, but *not as part of the annual course*.

We have now followed a company through its annual course of Musketry, of which, by the time it is over, most of the men are pretty

tired. A good Figure of Merit has been made, and goodbye is said to shooting for a whole year.

Extra Position drills are indeed enjoined, and more or less are performed, but Position Drill without any *immediate* object is not a very interesting employment, and it is very often gone through as a mere matter of form.

If the men knew that they might be called upon to fire the next day, they would take more interest in the drill; the necessity for which in order to make good practice, is now generally recognised. If a company, trained as I have above described, was sent to Target Practice, six months, or even one month, after the annual course, without any preliminary drill, the shooting would be very inferior. Great efficiency for the time, is doubtless attained by the present system, and perhaps such a high "Figure of Merit" could not be made under the system which I am about to propose, but I firmly believe that we should obtain greater real efficiency.

The interest in shooting would be kept up all through the year; the men would learn the necessity for keeping up their drill; and Musketry would no longer be looked upon as a separate department.

PART II.

Having enumerated what I consider weak points in our present system of Musketry Instruction, I now proceed to explain the changes I would make, and I believe that I can do so in the clearest manner by following the Musketry regulations right through, referring to the sections and paragraphs by marginal notes, and detailing the various alterations in regular order.

<p>I would abolish the title of Officer Instructor, and would have an</p> <p>Reference.</p> <p>Musketry Regulations—Part I,</p> <p>Para. 4.—Officer Instructors.</p>	<p>Adjutant and Assistant Adjutant in every regiment, who would divide the office work and the duties of instructing the men in <i>all</i> drills. This division of labor would be arranged by the Commanding Officer, who would take care that neither officer degenerated into the position of a mere Orderly Room Clerk.</p>
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The Adjutants would be charged with the duty of instructing all non-commissioned officers, recruits, and bad or indifferent drills.

They would also occasionally attend the drill and practice of companies, and would be responsible to the Commanding Officer that they were carried on with uniformity in all the companies.

<p>Para. 5.—Asst. Officer Instr.</p>	<p>Would not be required.</p>
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<p>Para. 11.—Sergt. Instructor.</p>	<p>Should be retained, but his services might be employed for teaching other drills, when he is not wanted for Musketry.</p>
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This title might be advantageously changed to Assistant Sergeant Major.

Part II.
Instruction of the Recruit.—Preliminary Drill.
Para. 2. As at present, except that the drill should extend over *at least* 12 days, but no recruit should on *any account* be allowed to fire until he has been sufficiently drilled.

As at present, but immediately after finishing the recruits' course, each man should go through the regular drilled soldiers' course of target practice.
Detail of Practices.

He would then be thoroughly taught and would afterwards shoot on an equality with older soldiers which no recruit can at present do.

Part III.
Annual Course for the trained Soldier.
Para. 2. The course is to commence on the , and is to continue throughout the year, at such seasons as may be most convenient, care being taken that every available man is exercised.

Each company, with all officers, non-commissioned officers and men, who may be off duty, will be frequently exercised in Preliminary Drills, Position Drill being performed, as a rule, at least once a week. Men who miss their turn for drill more than once a month, should attend as casuals with another company, constant practice in handling the rifle, and careful performance of the third practice of position drill being absolutely necessary to enable a man to retain thorough command of his rifle.
Para. 5.

Men whose shooting falls off, or who are awkward in the use of the rifle will receive extra instruction until they have overcome their faults.

The Commanding Officer will detail each company in succession to fire not more than 20 rounds in a day.
Para. 6. No regular roster should be kept, but all the companies should, under ordinary circumstances, complete 10 or 20 rounds before any company goes to practice a second time. When a company is detailed for target practice, all men will be struck off other duties.

Judging Distance Practice should be occasionally performed, and should be carried out in a thoroughly practical manner, but it will form no part of the Annual Course.

When companies are obliged to be detached for the purpose of shooting, they may fire through the whole course on consecutive days ; but this must never be done if it can possibly be avoided.
Para. 12.

Part IV.
Cleaning Arms, Lock Instruction.

Should be taught to recruits only.

Each man will be furnished with a card of the Form marked C, in which his score will be kept, each day's performance being initialed by the Officer superintending the practice.

Part V.
Practice Ball Firing.
Para. 17.

Men may fire in regular succession as formerly, but it may probably be found more convenient to allow two men at a time to come to the front, and permit them to fire alternate shots until the specified number of rounds has been expended. This plan would facilitate the keeping of the score.

Para. 20.

The Superintending Officer will count the number of Bull's eyes, centres, &c., made by each man as soon as he has completed the specified number of rounds; enter them in the Check Return (Form B), and after adding them up will compare the Target as often as may be required, making any additions or deductions that may be necessary.

Paras. 22 and 23.

The Adjutant, or his Assistant, will attend as often as possible, and will be looked upon as an umpire between the companies. Disputed hits, &c., will be referred to him, but captains alone will be responsible for the correctness of their Returns, &c.

Para. 24.

The Officer superintending the Practice will enter the total points made by each man in the Check Return before comparing Targets, at the same time returning the score card to the man who owns it, and informing him how many points he has been credited with.

Para. 27.

No shots fired can be cancelled, but if a man does not complete a distance, his total will not be made up, but each shot will be initialed, and the points already scored will be entered in pencil in the Company's Return until the end of the Musketry year, or until the man completes the distance.

Para. 28.

The Adjutant will occasionally examine the Companies' Returns, from which he will compile the Monthly and Annual Returns.

Para. 30.

Instead of firing five rounds at each distance as at present, the number of distances should be reduced, and ten rounds expended at each range. I cannot see that anything is gained by changing the distance, just perhaps, as a man has got his sighting.

Para. 33.

The size of Targets, Bull's Eyes, &c., and number of rounds fired at each range, would be as follows—

TWO TARGETS.

Bull's Eye, 1 ft. x 1 ft. : Centre 3 ft. x 3 ft.

1st PERIOD.	{	Recruits	...	{	100 yards	...	} 10 rounds at each distance standing.
				200 yards	...		
	{	Drilled Soldiers		200 yards	...		
				300 yards	...		

THREE TARGETS.

Bull's Eye, 2 ft. x 2 ft. ; Centre 4 ft. x 4 ft.

2ND PERIOD.	{	Recruits	...	{	400 yards	...	} 10 rounds at each distance kneeling.
				500 yards	...		
	{	Drilled Soldiers		500 yards	...		
				600 yards	...		

FOUR TARGETS.

Bull's Eye, 3 ft. x 3 ft. ; Centre 5 ft. x 5 ft.

3RD PERIOD.	{	Recruits	...	{	600 yards	...	} 10 rounds at each distance, sitting or lying down.
					700 yards	...	
	{	Drilled Soldiers		{	700 yards	...	
					800 yards	...	

Independent Firing ten rounds at 300 yards. Time limited to four minutes.

Volley firing ten rounds at 400 yards, for drilled soldiers and recruits.

Skirmishing ten rounds between 400 and 200 yards, for recruits.

Skirmishing at unknown distances and on unknown ground, for drilled soldiers.

In the above practices all shots striking the black line to count three; all others 2.

There will be no classification except as regards eligibility for prizes, and with a view to farther instruction if necessary. The minimum number of points in *each class* which would be required in order to qualify for a prize would have to be determined according to the weapon used.

b, c, d.

Every man would fire all the way up the range.

The summaries of mixed casual sections should be sent to the Adjutant at the conclusion of the day's practice. He will furnish the captains of companies with a memo of the number of points made by their casualties.

Men who do not make a certain number of points in their sixty rounds would be termed third class shots, and would go through a course of

Para. 61.

drill as recruits, afterwards firing twenty rounds in whichever period they shot worst in.

Men who qualified as marksmen would only be required to attend Position Drill once a month, as long as they retained command over their rifles. Such men might be trusted to drill themselves. Handling a rifle and occasionally snapping during leisure hours is as good as any formal drill to the really good shot ; but no man, however good, can afford to dispense with frequent drill.

Para. 62.

The Figure of Merit would be calculated as follows :—

Average points per man in 1st period	...
..... 2nd „	...
..... 3rd „	...
..... Volley Firing	...
..... Independent Firing...	

Total Figure of Merit...

Recruits only might be assisted in every way when firing their Recruits' Course, by putting up marks to aim at, etc. etc.

General Officers, will, when practicable, see at least one company (taken at random) fire ten rounds at

Para. 63.

unknown distances at any targets and in any formation they may direct. The result to be briefly but clearly shown in Annual Musketry Return, and Confidential Report.

Judging Distance Practice.
Paras 15, 16, 17.

Nearly as at present, but the

1st Period will be between 1 and 300 yards.

2nd 1 600 „

3rd 1 900 „

There will be no classification, each man will judge in all three periods.

Para. 19.

Recruits only will execute the regular course of Judging Distance Practice.

Omit all except No. 28, which directs that companies should occasionally be exercised in Judging Distance.

Remaining Paras.

Officers should take every means of training themselves to judge distance correctly.

To marksmen to the number of ten per cent per company &c.

Part VII.

Prizes for good Shooting, 4th Prize.

This would be fairer than giving the prizes regimentally, as the men of each company shoot under nearly the same conditions, which is not the case with all the companies of a battalion

The best shot of the battalion will be that soldier, who, having obtained the minimum qualifying number of points in *each* period, scores the greatest number of points in all three periods at the final competition of best shots of companies.

Para. 2.

The best shot of a company will be that soldier, who, having obtained the minimum qualifying number of points in *each* period, scores the greatest number of points in all three periods. At the termination of the Annual Course the best shots of companies will compete for the battalion prize, firing all up the range.

Para. 3.

To qualify a soldier for the position of marksman, he must have made the minimum qualifying number of points in each period.

Para. 4.

All men so qualifying will be entitled to wear the badge, but only the best shots of each company, to the extent of ten per cent., will receive prizes.

Para. 5.

By the above scheme it will be seen that I would propose to carry on the shooting of a regiment all through the year, and that the men should have frequent drill and constant opportunities of practice.

No extra work would be entailed by this change, on the contrary I believe that the labour would be lessened, and as there would never be too much at a time no one would ever get tired of it.

In addition to the ordinary position drills (which should never be too long) the greatest attention should be paid to the firing on parade ; men should be taught that they must always fire with the same deliberation and care as if they were on the range ; and officers and non-commissioned officers should at once check any faults that they may observe. It would very soon be almost unnecessary to do so ; as soon as the men understood what was expected from them they would take care to do it, and carelessness in the method of firing would become as rare as slovenliness in the execution of the manual exercise.

At present, men too often appear to think that it is only at Musketry drill that they need pay much attention to what they learn there.

Both Adjutants should be mounted, and should be employed in taking up points, carrying orders, estimating distances etc., one being attached to each wing would leave the junior Major free to attend to the command of his half battalion.

When there is spare ammunition, companies, or the whole battalion might practice at Targets representing an enemy in position, opening fire at unknown distances.

One or two rounds only, expended by the men in this way, would do a great deal of good.

Although it is directed that lectures should occasionally be given to the men, I fear that little is done in this way. It is not every one who has the gift of interesting his hearers, and lectures are too often a string of long words and dry technicalities. Every endeavour should be made to interest the soldier, and to afford him such practical information as will enable him to make the best use of his rifle under all circumstances of climate, weather and locality.

At present, instruction is too much confined to shooting at Targets, on level ranges, and under the most favorable circumstances. Many men who can make good scores under such conditions, are easily put out by having to shoot on less favorable terms, such as a bad light, hilly range, a denser or lighter atmosphere, &c.

It is not in Musketry alone that I should like to see the soldier more practical, more independent, and therefore more efficient. I believe that much might be done in improving the soldier in the use of other weapons, and in all the exercises of war, and this without any increase to the number of drills and parades that he now has.

But to consider this would be exceeding the limits to which I intend to restrict myself in the present paper.

I hope that others will give their views on the subject regarding which I have written. I wish it to be understood that my scheme is at present intended for the British Army only ; I do not think that Native Regiments are yet ready for the change. Musketry Instruction has been so recently introduced, and they have had such difficulties to contend with in the way of bad arms, paucity of officers, etc. that I think a continuous course of Target Practice, as at present, cannot yet be dispensed with.

The progress already made by the Native Army has, however, been really wonderful ; and as the system becomes better understood, we may expect before long, to find, that the same change will be necessary for the Native Army, as I believe the British Army is now ready for.

RIFLEMAN.

1874-75.

Musketry Practice Return of C. Company of the above Corps for the year 1874-75.

Total points last course.	Succession No.	Regimental No.	Rank and Name.	1st Period.	2nd Period.	3rd Period.	Total.	Average Volleys.	Average Independent.	* Average Skirmishing.	If Marksman insert M.	Remarks showing date and cause of becoming non-effective &c.
135	1 2 3 4 5 6 7 8 Add ... Deduct	195	C. S. Corpl. Pte. T. Atkins	52	48	40	140	20'00	19'50	NIL	M.	
		... ...	..... .....	... 18	... 4	... 3	... 17					

For Recruits only.

FORM B.
1ST BATTALION—1ST REGIMENT.

C. COMPANY—1ST SECTION.

Check Return of Target practice at
Rounds fired 10 Dated at

Range 200 yards.
3rd February 1875.

Succession No.	Bull's Eyes.	Centres.	Outers.	Ricochets.	Misses.	Total Points.
1						
2						
3	3	5	2	0	0	31
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
Totals.						
Target. Register.	45	99	55	0	1	587
Difference.	43	98	53	5	1	572
	-8	-3	-4	...	...	-15

Deduct 15, A. B. Captain.

I certify that the points recorded above agree with the scores made by the men firing, and that on comparing the Targets the above discrepancies were discovered by me.

Capt., Commanding C. Company.

(21)

FORM C.

1st BATTALION—1st REGIMENT.

C. COMPANY.

Record of Target Practice for 1874-75.

No. 195 PRIVATE T. ATKINS. SUCCESSION No. 3.

Date.	Range.	Number of Shots.										Total.	Initials of Supdg. Officer.
	<i>Yards.</i>	1	2	3	4	5	6	7	8	9	10		
3-2-75	200	3	2	4	4	3	3	2	4	3	3	31	A. B., Captain.
12-2-75	300	2	0	2	3	4	3	3	R.	2	2	21	C. D., Lieutenant.
19-2-75	500	2	3	3	2	3	4	4	2	0	2	25	A. B., Captain.
1-3-75	600	R.	0	3	3	2	4	2	4	3	2	23	A. B., Captain.
12-3-75	700	0	0	2	4	3	3	2	2	2	4	22	C. D., Lieutenant.
12-3-75	800	2	3	R.	R.	2	3	4	2	0	2	18	A. B., Captain.
	Total	..	52	+	48	...	+	40	...	...	...	140	Marksman A. B., Captain.
Volley Firing. Average of Section												20-00	
Independent Firing. Ave- rage of Section												19-50	
* Skirmishing. Average of Target												14-00	
* For Recruits only													

I certify that the above is a true and correct record of the practice made by No. 195, Private T. Atkins, during the Musketry year 1874-75, each day's total having been initialed by the Officer Superintending the practice.

CAPTAIN,

COMMANDING C. COMPANY,

1st Battalion, 1st Regiment.

IV.

Memorandum showing the shortest time in which a force of 10,000 men could be transported by railway to Lahore from the several military stations on or near the line of railway.

[NOTE.—The total number of miles to be travelled by railway amounts to 12,397 ; and the time occupied in transport excepting of the Battery of Mountain Artillery from Jutog, would be 98 hours from receipt at Army Head Quarters at Simla of the order for the despatch of the Force.]

A report reaches the Head-Quarters of the Army at Simla on the morning of the 1st September that disturbances have suddenly broken out on the North-West Frontier, and that the Government of India considers it necessary to assemble a force of about 10,000 men with 36 guns at Lahore.

2. Required the shortest time in which the troops could reach Lahore by rail : the infantry to be provided with 200 rounds per man, and artillery with single line of wagons, but without any reserve, ordnance, or commissariat stores.

3. The following statements show the amount of rolling stock available on the several lines of railway in Bengal, and the number of vehicles required for each Arm of the Service :—

Return of Rolling-stock in use on the under-mentioned lines of Railway on 31st December 1871.

RAILWAYS.	CARRIAGES.										VANS.				WAGONS.							
	Saloon.	1st Class.	Composite.	2nd Class.	2nd Class.	inter- mediate	inter- mediate	3rd Class.	3rd Class.	3rd Class.	Hospital.	Horse.		Cattle.	Powder.	Brake.	Covered.	Cotton.	Low-sided (open).	High-sided (fixed).	Rail and timber.	Carriage trucks.
												Double.	Single.									
East Indian	5	73	21	100	49	inter- mediate	370	...	...	...	3	33	42	55	31	271	3,925	...	1,201	..	127	39
Punjab and Delhi*	...	10	34	39	8	inter- mediate	201	24 double storey	...	...	1	2	26	1	11	68	1,337	...	300	90	60	18
Great Indian Peninsula	3	47	76	151	...	...	371	...	83 4th Class	6	...	93	106 sheep trucks	17	340	410 goods	2,682	2,430	416	156	26	26
Eastern Bengal	4	8	11	9	...	...	28	42 4th Class	19 4th Class	...	...	...	6	4	...	10,289 large 40 small	...	...	44	24	15	4
Oudh and Rohilkund	...	4	3	5	...	...	86	...	...	...	...	...	5	...	2	5	191	...	...	...	83	...

* Return corrected up to the 1st August 1872.

NOTE.—The Railway Companies consider that a deduction of 5 per cent. should be made from the above figures for vehicles under repair if required on an emergency, it would be safer, however, to accept 15 per cent. as the deduction to be made.

VEHICLES.	East Indian Railway.	Punjab and Delhi Railway.	Great Indian Peninsula Railway.	Eastern Bengal Railway.	REMARKS.
Saloon	Seats. 8	Seats. ...	Seats. 28	Seats. 20	I—Of heavy stores, such as shot and shell, timber and half-wroughts, tools, implements, iron-work, and repository apparatus, the full amount of its weight carrying capacity may be placed on any carriage adapted for goods.
1st Class...	24	24	30	24	
Composite	16	20	30	28	
2nd Class	32	32	32	40	II—Of medium stores, such as arms in cases, accoutrements, saddle-ry, rope, fire-engines, oil and liquid paints, about $\frac{1}{3}$ ths of the estimated weight may be placed on a carriage.
Ditto	24	...	32 Br. or 40 Native soldiers.	...	
3rd Class	42	30	Ditto	60	III—Of light stores, such as serge, canvas, wool, hides, cloth, dry paints : component parts of camp equipage, such as water-vessels, lanterns &c., empty powder barrels and packing cases, drums, musical instruments, &c., the full capacity of the carriage in cubic measurement.
Ditto	30	40	...	...	IV.—The wagons provided for the use of troops vary considerably in carrying capacity, but experience has shown that 90 maunds weight of camp equipage, kits, &c., can on an average be placed in each covered wagon, and half that amount in each brake-van.
Ditto	48	...	...	...
Hospital...	12 beds...	8 beds..	5 beds...	...	V.—Doolies are difficult to stow away ; but if dismantled and carefully packed, 24 doolies can be placed in each covered wagon, and about half that number in each brake-van.
Horse-van, double	6 horses	...	...	...	VI.—A powder-van of 5 tons will carry 224 barrels (50lbs. each) of powder, or 450 boxes of small-arm ammunition ; and a van of 8 tons will carry 920 boxes. In boxes the full weight carrying capacity of the powder-van can be taken in barrels about 1-5th less.
Ditto, single	3 ,,	3 horses	3 horses	3 horses	

CAPACITY OF THE SEVERAL VEHICLES—concluded.

VEHICLES.	East Indian Railway.	Punjab and Delhi Railway.	Great Indian Peninsula Railway.	Eastern Bengal Railway.	REMARKS.
Cattle-van ...	6 cattle	...	8 cattle tons.	6 cattle	VII.—Low-sided wagons are best adapted for field guns; they vary in length from 16 to 21 feet, and will hold three pairs and four pairs of wheels, respectively, i. e. a gun and limber or a wagon and limber, together with a second limber or wagon-body. One of these wagons will hold a heavy gun and its limber.
Powder-van ...	8 tons or 650 c. feet	5	5	...	
Brake-van ...	4 tons	3	...	...
Covered wagons ...	8 tons or 650 c. feet	6	9	tons 9	VIII.—Long timber trucks will hold a gun or wagon-body and two limbers, the gun or wagon-body being placed in the centre.
Cotton wagon ...	...	...	7	...	
Low-sided wagon ...	tons 7	9	7	...	IX.—Carriage trucks will hold a gun or wagon-body and one limber. Neither the limber nor carriage truck are adapted for heavy ordnance.
High-sided wagon ...	7	6	7	10	
Rail and timber wagon...	7	6	6	9	X.—To pack field carriages as closely as possible, it is advisable to have two trucks, load the rear one, then run the carriages end-on into the one in front over a platform or planks, unship shafts and spare wheels, and the carriages will then pack tire to tire.
Carriage trucks ...	4	5	(?)	9	
					XI.—Low-sided wagons can be made available for horses, cattle, &c., by railing them up to 5 feet. Covered wagons can also be made available by removing the roofs which can be done in a few hours.

	Double-poled tent. Weight. Mds. Seers. 82 36	Single-poled tent. Weight. Mds. Seers. 20 16	Hill tent. Weight. Mds. Seers. 8 15	Staff Sergeant's tent. Weight. Mds. Seers. 6 1	E. P. tent, new pattern. Weight. Mds. Seers. 11 8	PAL Weight. Mds. Seers. 3 10	Necessary tent. Weight. Mds. Seers. 2 0
General Officer Commanding a Divn.	2	..	..	..	2	1
" " " a Bde.	1	1	..	..	1	1
Cols., Lieut.-Cols., & Majs. in Command	..	1	..	..	..	1	1
Majs. not in Comd. & Capts. Comdg.	1	..	..	1	1
Captains and Subalterns	1	..	..	..	1
Mess, Regt. of British Cavy. or Infy...	1	..	..	..	..	..	..
" " of Native " or "	1	..	..	..	1	..
" Battery of Royal Artillery	1	..	..	..	1	..
Guards, Regts. of British Cavy. or Infy.	2	..	..
" " of Native " or "
" Battery of Royal Artillery	1	..	..
Hospital, Regiment of British Cavy.	6	..	..
" " of " Infy.	11	2	..
" " of N. Cavy. or Infy.	2	..
" Battery of Horse or Field Aty.	3	..	1
" " of Mountain "	1	2	..

Note—British soldiers ... 16 men to a tent.
Native soldiers ... 4 palls per Company.
Artificers and Lascars with Batteries of Horse and Field Artillery ... 2 palls.

Approximate calculation of the number of vehicles required for the conveyance of the several Arms of the Service by the broad gauge Railway.

[NOTE. —In calculating the number of vehicles required for each unit, no allowance has been made for Commissariat supplies or followers, as I have failed to procure any certain information on these points, but it is very necessary that the amount of transport that would be required for such purposes should be accurately laid down, as also for the bazaar establishment which ordinarily accompanies every Corps.]

BATTERY OF ROYAL HORSE ARTILLERY.

STRENGTH:

6 Officers.						
2 Staff Sergeants.						
155 Non-Commissioned Officers and Men.						
2 Medical Subordinates.						
6 Officers ...	...	...	1	1st class	...	{ Two compartments only.
2 Staff Sergeants ...	{					
2 Medical Subordinates						{ One compartment of 1st class being occupied.
155 Non-Commissioned Officers and men				5	2nd "	
253 Followers	...	...	6	3rd "	...	{ One compartment of 2nd class being occupied.
193 Horses	...	...	32	Double horse or cattle-vans.		
89 Ponies	...	...	9	Cattle-vans.		
20 Bullocks	...	...	2	Ditto		
Guns' wagons and store						
Carts*	...	...	12	Low-sided wagons.		
Harness and Battery stores				2	Covered wagons.	
Baggage and Camp				6	{ " " and	
equipage				2		
16 Doolies	...	...	1	Covered wagon.		
Total				...	78 vehicles.	

* It is presumed that the ammunition boxes would remain on the wagons and limbers, and not be placed in powder-vans; the wood fires used on the Delhi and Punjab Railway would be a trial, but if the boxes were properly protected by tarpaulins, it is believed there would be no danger.

BATTERY OF ROYAL HORSE ARTILLERY—(concldd).

DETAIL OF FOLLOWERS, HORSES, BAGGAGE & CAMP EQUIPAGE—(concldd.)

Followers.				Bullocks.			
Hospital	...	...	21	Battery	...	...	17
Doolie bearers	...	...	99	Puckallie	...	...	3
Quarter Master and Conser-							
vancy	...	...	15				
Additional tent lascars			16				
Native Artificers and store				Baggage.			
lascars	...	...	22	M. S.			
Officers' syces	15	} Not includ- ed in total, as they ac- company horses, ponies, and bullocks.		1 Major	...	6	0
Battery "	121		1 Captain	...	5	0	
Grass-cutters	89		4 other Officers	...	16	0	
Ordnance bullock-			Mess	...	6	0	
drivers	9		2 Staff Sergeants	...	4	0	
Puckallie bhisties	3			2 Medical Subordinates	4	0	
<hr/> Total ... 237			173	155 Soldiers	...	155	0
<hr/>				Cooking utensils	...	6	0
6 Officers	...	...	37	Hospital equipment	6	0	
Officers' grass-cutters	...	...	15	253 Followers	...	126	20
Mess	...	...	8	16 Doolies.			
2 Staff Sergeants	...	...	2	<hr/> Total ... 334 20			
2 Medical Subordinates	...	...	2	<i>Camp equipage.</i>			
10 per cent. for troops	...	...	16	1 Major	...	13	25
<hr/> Total ... 253				1 Captain	...	10	15
<hr/>				4 other Officers	...	41	20
<i>Horses.</i>				Mess	...	23	26
1 Major	...	...	4	2 Staff Sergeants	...	12	2
1 Captain	...	...	3	1 Hospital Sergeant	}	6	1
4 other Officers	...	...	8	1 Farrier			
Battery	...	...	178	2 Medical Subordinates		6	1
<hr/> Total ... 193				155 Soldiers, 10 European			
<hr/>				private tents	...	110	30
				Guard, 1 "	...	11	3
				Hospital { 3 European	}	35	9
				private tents			
				1 Necessary			
				Artificers	...	6	20
<hr/> Total ... 276			32	<hr/>			

Total weight to be carried—611 mds. 12 seers.

BATTERY OF FIELD ARTILLERY.

STRENGTH :

6 Officers.			
2 Staff Sergeants.			
155 Non-Commissioned Officers and men.			
2 Medical Subordinates.			
6 Officers ...	...	1	1st class Two compartments.
2 Staff Sergeants	}	5	2nd „ One compartment of 1st class being occupied.
2 Medical Subordinates			
155 Non-commissioned Officers and men			
246 Followers ...	...	6	3rd „ One compartment of 2nd class being occupied.
118 Horses ...	...	20	Double horse or cattle-vans.
55 Ponies	}	8	Cattle-vans.
27 Bullocks			
Guns, wagons and store carts	...	12	Low-sided wagons.
Harness and Battery stores	...	1	Covered wagon.
Baggage and Camp equipage	}	6	Covered wagons, and
		2	Brake-vans.
16 Doolies	...	1	Covered wagon.
<hr/>			
Total 62 vehicles.			

DETAIL OF FOLLOWERS, HORSES, BAGGAGE, AND CAMP EQUIPAGE.

<i>Followers.</i>				<i>Horses.</i>			
Hospital	...	...	21	1	Major	...	2
Doolie bearers	...	...	99	1	Captain	...	2
Quarter Master and Conser-				4	other Officers	...	4
vancy	...	15			Battery	...	110
Additional tent lascars	...	16					
Native artificers and store						Total	118
lascars		22					
<hr/>							
Officers' syces	8	} Not includ- ed in total as they ac- c o m p a n y the horses, ponies and bullocks.	}	<i>Bullocks.</i>			
Battery "	74			Battery	...	24	
Grass-cutters	55				Puckallie	...	3
Ordnance bullock							
drivers	12						
Puckallie bhisties	3				Total	27	
<hr/>				<hr/>			
Total	...	152	173				

BATTERY OF FIELD ARTILLERY—(concldd).**DETAIL OF FOLLOWERS, HORSES, BAGGAGE & CAMP EQUIPAGE—(concldd).**

Brought forward	... 173	<i>Baggage.</i>	
6 Officers	... 37		<i>M. S.</i>
Officers grass-cutters	... 8	As for a Battery of Royal	
Mess	... 8	Horse Artillery, minus 3½	
2 Staff Sergeants	... 2	maunds, the allowance for	
2 Medical Subordinates	... 2	7 followers	... 331 0
10 per cent. for troops	... 16	<i>Camp equipage.</i>	
	—	As for a Batty of Royal	<i>M. S.</i>
Total	... 246	Horse Artillery	... 276 32
	—	Total weight to be carried,—607	
		mds. 32 seers	

BATTERY OF MOUNTAIN ARTILLERY.**STRENGTH :**

6 Officers.

2 Staff Sergeants.

92 Non-Commissioned Officers and men.

119 Native Drivers.

2 Medical Subordinates.

6 Officers	... 1	1st class	... Two compartments.
2 Staff Sergeants	... }		
2 Medical Subordinates	... }		
92 Non-commissioned Officers and men	... 3	2nd "	... { One compartment of 1st class being occupied.
200 Followers	... 5	3rd "	
12 Horses	... 2	Double horse-vans.	
178 Mules	... }		
3 Bullocks	... 18	Cattle-vans.	
Guns, carriages, ammunition boxes, &c.	... 1	Powder-van.	
Harness and Battery stores	... 2	Covered wagons.	
Baggage and Camp equipage	... 5	" " and	
	... 2	Brake-vans.	
12 Doolies			

Total 39 vehicles.**DETAIL OF FOLLOWERS, HORSES, BAGGAGE AND CAMP EQUIPAGE.**

<i>Followers</i>		<i>Baggage</i>	<i>M. S.</i>
Hospital	... 21	1 Major	... 6 0
Doolie bearers	... 75	1 Captain	... 5 0
Qr. Mr. and Conservancy	... 12	4 other Officers	... 16 0
Additional tent lascars	... 6	Mess	... 6 0
Native artificers and store		2 Staff Sergeants	... 4 0
lascars	... 19	2 Medical Subordinates	... 4 0
	133		41 0

BATTERY OF MOUNTAIN ARTILLERY—(concldd).

DETAIL OF FOLLOWERS, HORSES, BAGGAGE & CAMP EQUIPAGE—(concldd).

				M.	S.
Brought forward		... 133		41	0
Drivers	... 119	} Not included in total as they accompany the horses &c.	92 Soldiers	... 92	0
Officers' syces	8		Cooking utensils	... 3	0
Battery	" 4		Hospital equipment	... 4	0
Muleteers	... 22		200 Followers	... 100	0
Grass-cutters	40				
Puckallie bhisties	3			Total	240 0

Total ... 196 133

6 Officers	...	...	37
Officers' grass-cutters	...	...	8
Mess	...	...	8
2 Staff Sergeants	...	...	2
2 Medical Subordinates	...	...	2
10 per cent. for troops	...	...	10
Total	...	...	200

12 Doolies—ten for Europeans and two for Natives.

		M.	S.
Camp Equipage			
1 Major	...	13	25
1 Captain	...	10	15
4 other Officers	...	41	20
Mess	...	23	26
2 Staff Sergeants	...	12	2
1 Hospital Sergeant	...	6	1
1 Farrier	...	...	...
2 Medical Subordinates	...	6	1

92 Soldiers, 6 European private tents ... 66 18

118 Native drivers, farriers and salootries, 6 Pâls, 19 20
Guard ... 11 3

Hospital	{ 1 European private's tent and 1 Pâl ... }	14	13
„	Native 1 Pâl ...	3	10

Total ... 227 34

4 Staff Sergeants... 24 1
8 European Privates ... 88 24

Total ... 112 25

For the above in the hills—

15 pâls weighing ... 48 30

Difference ... 63 35

Total weight to be carried—580 mds. 19 seers, or, in the hills 516 mds, 24 seers.

Horses.

1 Major	...	...	2
1 Captain	...	...	2
4 other Officers	...	...	4
Battery	...	...	4
Total	...	...	12

Mules.

Battery ... 178

Bullocks.

Puckallie ... 3

REGIMENT OF BRITISH CAVALRY.

STRENGTH :

25 Officers.

11 Staff Sergeants.

444 Non-Commissioned Officers and men.

4 Medical Subordinates.

25 Officers	...	...	2	1st class.
11 Staff Sergeants	...	...
4 Medical Subordinates	}		15	2nd class... with 23 spare seats
444 Non-Commissioned Officers and men		...		
716 Followers	...	...	17	3rd class ... 34 men occupying 23 seats in second class.
503 Horses	...	...	84	Double horse or cattle-vans.
218 Ponies...	...	...	23	Cattle-vans.
12 Bullocks	...	...
Harness and Regimental stores	...	...	2	Covered wagons.
Baggage and Camp	{		20	" " and
equipage		...	1	Brake-van
		...	2	Covered wagons, and
45 Doolies	...	...	1	Brake-van.
Ammunition	...	...	1	Powder-van.
Total ... 168				vehicles.

DETAIL OF FOLLOWERS, HORSES, BAGGAGE AND CAMP EQUIPAGE.

Followers.

Hospital	...	...	54
Doolie bearers	...	...	279
Quarter Master and Con-			
servancy...	...	...	35
Bazaar	...	...	4
Additional tent lascars	...	...	42
Native Farriers	...	...	6

Total ... 420

Ponies.

Grass-cutters	218
---------------	-----	-----	-----

Bullocks.

Puckallie	12
-----------	-----	-----	----

Baggage.

	M.	S.
3 Field Officers	...	18 0
6 Captains	...	30 0
13 Lieutenants	...	52 0
1 Surgeon	...	6 0
1 Assistant Surgeon as		
Captain	...	5 0
1 " " as Lieute-		
nant	...	4 0
Mess	...	24 0
11 Staff Sergeants	...	22 0
4 Medical Subordinates		8 0

Officers' syces	64	} Not included in total, as they accompany the horses, ponies, and bullocks.
Regimental syces	252	
Grass-cutters	218	
Puckallie bhisties	12	

546

169 0

REGIMENT OF BRITISH CAVALRY—(concldd).

DETAIL OF FOLLOWERS, HORSES, BAGGAGE, & CAMP EQUIPAGE—(concldd).

	Brought forward ...	169	0
	444 Soldiers ...	444	0
	Cooking utensils ...	24	0
	Hospital equipment ...	30	0
	716 Followers ...	358	0
	45 Doolies.		
1 Lieutenant Colonel ...	8		
2 Majors ...	12		
6 Captains ...	36		
13 Lieutenants ...	78		
3 Medical Officers ...	18		
Mess ...	20		
Officers' grass-cutters ...	64		
11 Staff Sergeants ...	11		
4 Medical Subordinates ...	4		
10 per cent for troops ...	45		
Total ...	716		
<i>Horses.</i>			
3 Field Officers ...	12		
6 Captains ...	18		
13 Lieutenants ...	26		
3 Medical Officers ...	11		
Regimental ...	436		
Total ...	503		
<i>Camp equipage.</i>			
1 Lieutenant-Colonel ...	25	M.	3
Majors ...			
1 Surgeon ...			
6 Captains ...	62		10
13 Lieutenants ...	155		25
2 Assistant Surgeons ...			
Mess ...	36		6
11 Staff Sergeants ...	48		8
4 Medical Subordinates ...	18		3
28 European private tents for troops ...	310		4
6 Hospital private tents for troops ...			
2 Pals ...			
2 European private tents for guards ...	22		8
Total ...	792		3

Total weight to be carried—1,817
mds. 3 seers.

REGIMENT OF BRITISH INFANTRY.

STRENGTH:

30 Officers.			
9 Staff Sergeants.			
876 Non-Commissioned Officers and men.			
4 Medical Subordinates.			
30 Officers ...	2	1st class.	
9 Staff Sergeants ...			
4 Medical Subordinates ...			
876 Non-Commissioned Officers and men ...	28	2nd class ... with 7 spare seats.	
1,057 Followers ...	26	3rd class ... 17 men occupying 7 seats in 2nd class.	

REGIMENT OF BRITISH INFANTRY—(concldd).

STRENGTH—(concldd).

7 Horses	...	...	1	Double horse-van, and
16 Bullocks	...	...	2	Cattle vans.
Baggage and Camp	...	...	31	Covered wagons, and
equipage	...	...	1	Brake-van.
99 Doolies	...	...	3	Covered wagons, and
			2	Brake-vans.
Ammunition	...	...	1	Powder-van.

Total ... 97 vehicles.

DETAIL OF FOLLOWERS, HORSES, BAGGAGE AND CAMP EQUIPAGE.

[illegible]

REGIMENT OF BRITISH INFANTRY—(contd).

DETAIL OF FOLLOWERS, HORSES, BAGGAGE & CAMP EQUIPAGE—(concldd).

	Brought forward	...	1,174	31
	2 European private tents for guards	...	22	8
	Total	...	1,196	39
<i>Bullocks.</i>				
Puckallie	...	...	16	
Total weight to be carried—2,850 mds. 19 seers.				

REGIMENT OF NATIVE CAVALRY.

STRENGTH :

8 Officers.

13 Native Officers.

444 Non-Commissioned Officers and men.

2 Medical Subordinates.

8 Officers	...	...	1	1st class	...	With one spare compartment.
13 Native Officers	...					
2 Medical Subordinates	...					
444 Non-Commissioned Officers and men	...	...	14	2nd class	...	7 Native Officers occupying spare 1st class compartment, and 4 men going into 3rd class.
196 Followers	...	...	5	3rd class	...	With four spare seats.
484 Horses	...	...	80	Double horse-vans and		
235 Ponies	...	...	24	Cattle-vans.		
Harness & Regimental stores	...	...	1	Covered van, and		
Baggage and Camp equipage	...	...	1	Brake-van.		
6 Doolies	...	...	7	Covered wagons.		
Ammunition	...	...	1	Brake-van.		
			1	Powder-van.		
Total				...	135	vehicles.

DETAIL OF FOLLOWERS, HORSES, BAGGAGE, AND CAMP EQUIPAGE.

<i>Followers.</i>			<i>Baggage.</i>			<i>M.</i>	<i>S.</i>
Hospital ...	...	7	3 Field Officers ...	...	18	0	
Doolie bearers ...	...	38	2 Captains ...	...	10	0	
Quarter Master and Con-			3 Lieutenants ...	...	12	0	
servancy ...	...	8	Mess ...	...	16	0	
Bazaar and Educational		5					
		58	13 Native Officers ...	...	26	0	
Officers' syces 18	Not included in total, as the accompany the horses & ponies.		2 Medical Subordinates	...	4	0	
Native Officers' syces ...		20	444 Soldiers ...	...	222	0	
Regimental syces ...		222	Hospital equipment	...	22	0	
			6 Doolies ...	...		
		260	Total ...		330	0	
1 Lieutenant-Colonel ...		8					
2 Majors ...		12					
5 other Officers ...		30					
Mess ...		10					
Officers' grass-cutters ...		18					
13 Native Officers ...		13					
2 Medical Subordinates ...		2					
10 per cent. for troops ...		45					
Total ...		196					
<i>Horses.</i>			<i>Camp equipage.</i>			<i>M</i>	<i>S.</i>
1 Lieutenant-Colonel ...	...	3	1 Lieutenant-Colonel...	...	25	26	
1 Surgeon ...	...	3	2 Majors ...	...	27	10	
6 other Officers ...	...	12	5 other Officers ...	...	51	35	
13 Native Officers ...	...	20	Mess ...	...	23	26	
444 Soldiers ...	...	444	7 Senior Native Officers	...	18	8	
2 Hospital Assistants ...	...	2	at mds. 2-24 each ...	...		
Total ...		484	6 Junior Native Officers	...	5	10	
			at seers 35 each ...	...		
			444 Soldiers, at 12½ seers	...	138	30	
			each ...	...		
			2 Pals for hospital ...	...	6	20	
			2 Pals for guards ...	...	6	20	
			Total ...		303	25	
<i>Ponies.</i>			Total weight to be carried—633				
Regimental ...	...	222	mds. 25 seers.				
Native Officers' ...	...	13					
Total ...		235					

REGIMENT OF NATIVE INFANTRY.

STRENGTH :

8 Officers.

16 Native Officers.

696 Non-Commissioned Officers and men.

2 Hospital Assistants.

8 Officers	...	...	1	1st class	...	With one spare compartment.
16 Native Officers and Hospital Assistants ..	}		23	2nd class.		
696 Non-Commissioned Officers and men ...						
272 Followers	...	...	7	3rd class.		
8 Horses	...	...	1	Double horse-van, and		
			1	Single ditto.		
Baggage and Camp equipage	...	...	8	Covered wagons, and		
			1	Brake-van.		
8 Doolies	...	...	1	Brake-van.		
Ammunition	...	...	1	Powder-van.		
Total	...	44		vehicles.		

DETAIL OF FOLLOWERS, HORSES, BAGGAGE, AND CAMP EQUIPAGE.

<i>Followers.</i>			<i>Baggage.</i>			<i>M. S.</i>
Hospital	...	12	3 Field Officers	...	18	0
Dooliebearers	...	50	2 Captains	...	10	0
Quarter Master & Con-servancy	...	27	3 Lieutenants	...	12	0
Bazaar and Educational	...	7	Mess	...	16	0
		—	17 Native Officers	...	34	0
			2 Hospital Assistants	...	4	0
			716 Soldiers	...	358	0
			Hospital equipment	...	22	0
Officers' syces	8	} Not included, as they accompany the horses	8 Doolies.			
			Total	...	474	0
			<i>Camp equipage.</i>			<i>M. S.</i>
1 Lieutenant-Colonel	...	8	1 Lieutenant-Colonel	...	25	26
2 Majors	...	12	2 Majors	...	27	10
5 other Officers	...	30	5 other Officers	...	51	35
Mess	...	10	Mess	...	23	26
Officers' grass-cutters	...	8	17 Native Officers	...	55	10
17 Native Officers	...	34	17 Soldiers	...	104	0
2 Hospital Assistants	...	2	2 Hospital Assistants	...	6	1
10 per cent. for troops	...	72	2 Pals for Hospital	...	6	20
			2 Pals for Guards	...	6	20
Total	...	272				
			Total	...	306	28

Horses.

8 Officers ... 8

Total weight to be carried—780 mds. 28 seers.

COMPANY OF SAPPERS AND MINERS.

STRENGTH :

1 Officer.

2 British Non-Commissioned Officers.

2 Native Officers.

112 Non-Commissioned Officers and men.

1 Medical Subordinate.

1 Officer	...	...	...	}	1	1st class
2 British Non-Commissioned Officers	...	...	...
2 Native Commissioned officers, and	...	...	...		3	2nd class ... Spare men occupying seats in 3rd class.
112 Non-Commissioned officers and Men	...	...	...	}
51 Followers	...	...	...		2	3rd class, with 29 spare seats.
Equipment and doolie	...	...	...	}	1	Covered wagon, and
					1	Brake-van.
Baggage and camp equipage	...	...	...	}	1	Covered wagon and
					1	Brake-van.
Ammunition	...	...	...		1	Powder-van.
Total ...					11	vehicles.

DETAIL OF FOLLOWERS, HORSES, BAGGAGE AND CAMP EQUIPAGE.

<i>Followers.</i>		<i>Baggage.</i>		<i>M. S.</i>
Hospital ...	4	1 Lieutenant ...	4	0
Doolie bearers ...	6	Mess ...	4	0
Quarter Master and Conservancy ...	6	2 British Non-Commissioned Officers ...	4	0
Bazaar ...	1	2 Native Officers ...	4	0
Native artificers (in a Pontoon Company there are 14 Native artificers)	7	1 Medical Subordinate	2	0
	—	112 Soldiers ...	56	0
	24	Hospital equipment	4	0
	—	1 Doolie.		
		Total ...	78	0

COMPANY OF SAPPERS AND MINERS—(concldd).

DETAIL OF FOLLOWERS, HORSES, BAGGAGE & CAMP EQUIPAGE—(concldd).

			<i>Camp equipage</i>	<i>M. S.</i>
1 Lieutenant	6		1 Lieutenant	10 15
Mess	4		2 British Non-Com-	
2 British Non-Commissioned			missioned Officers ...	6 1
Officers	2		2 Native Officers ...	6 20
2 Native Officers	2		1 Medical Subordinate	3 10
1 Medical Subordinate ...	1		5 Pals for troops ...	16 10
10 per cent. for troops ...	12		1 Ditto for Hospital...	3 10
			1 Ditto for Guard ...	3 10
Total	51		Total	48 36

Total weight to be carried—
228 mds. 6 seers.

Equipment. *M. S.*
General service Engineers equip-
ment for one Company... 101 10

4. A force of about 10,000 men with 36 guns would probably consist of—

			<i>Men.</i>
1 Regiment of British Cavalry			450*
3 Regiments of " Infantry at 876 each ...			2,628
4 " of Native Cavalry at 440 " ...			1,760
7 " of " Infantry at 712 " ...			4,984
3 Companies of Sappers and Miners, at 112 " ...			336
Total			10,158

With—

- 2 Batteries of Royal Horse Artillery.
- 3 " of Field Artillery.
- 1 Battery of Mountain ditto.

5. These troops could be most expeditiously collected from the following stations on or near the line of rail, viz.:—

1 Battery of Royal Horse Artillery from	Umballa.
1 " of " "	Meerut.
+ 1 " of Field Artillery "	Mooltan.
1 " of " "	Jullundur.
1 " of " "	Cawnpoor.
1 " of Mountain Artillery "	Jutog.

* The established strength of each unit has been taken as easier to calculate ; but in the event of troops being ordered on service, a certain percentage would have to be deducted for sick, absentees, and the depot.

+ In the event of troops being urgently required at Lahore, the Battery of Field Artillery and Regiment of Native Infantry would, no doubt, be taken from Ferozepoor ; but as these would not require rail transport, they are not considered in the present calculation.

1 Regiment of British Cavalry	from Umballa.
1 " of " Infantry	" Jullundur.
1 " of " "	" Umballa.
1 " of " "	" Roorkee and Delhi.
1 " of Native Cavalry	" Mooltan.
1 " of "	" Umballa and Jullundur.
1 " of "	" Meerut and Agra.
1 " of "	" Cawnpoor.
1 " of Native Infantry	" Mooltan.
1 " of "	" Jullundur.
1 " of "	" Umballa.
1 " of "	" Dehra.
1 " of "	" Meerut.
1 " of "	" Agra.
1 " of "	" Cawnpoor.
3 Companies of Sappers and Miners	" Roorkee.

6. Telegrams would be despatched during the afternoon of the 1st September, and by 6 P.M. (a special messenger being sent from Landour to Dehra, where there is no Telegraph Station) the several Corps would have received intimation of the intended move.

7. The only troops not actually on the line of railway are the Mountain Battery at Jutog, the Wing of British Infantry, and three Companies of Sappers and Miners stationed at Roorkee, and the 2nd Goorkhas at Dehra. Jutog is 94 miles from Umballa, where the Battery could arrive on the 6th September; Roorkee is distant only 24 miles, and Dehra only 44 miles, from Saharunpoor: a sufficiency of carriage is always procurable in the neighbourhood of Roorkee at a few hours' notice, and the troops could without difficulty reach Saharunpoor 66 hours after the receipt of the telegram, and be able to start as laid down in the accompanying statement.

The Goorkha Regiment stationed at Dehra is provided with four elephants, and as carts are always procurable at Rajpoot and in Dehra itself, it could march 12 hours after notice and reach Saharunpoor in time to start by train at 9 o'clock P. M. on the 4th September.

8. The following number of vehicles would be required at the several stations, viz. :—

	Vehicles.
MOOLTAN ... { 1 Battery of Field Artillery 62	
... { 1 Regiment of Native Cavalry 135	
... { 1 " of " Infantry 44	
	<hr/>
Total ...	241

JULLUNDUR	...	{	1 Battery of Field Artillery ...	...	...	62
			1 Regiment of British Infantry	...	...	97
			1 " of Native "	...	...	44
			Total	...	...	203
UMBALLA	...	{	1 Battery of Royal Horse Artillery ...	...	...	78
			1 " of Mountain	...	...	39
			1 Regiment of British Cavalry...	...	...	167
			1 " of " Infantry	...	...	97
			1 " of Native Cavalry*	...	...	135
			1 " of " Infantry	...	...	44
			Total	...	...	560
SAHARUNPOOR	...	{	$\frac{1}{2}$ Regiment of British Infantry	...	...	48
			3 Companies of Sapper and Miners	...	...	28
			1 Regiment of Native Infantry	...	...	44
			Total	...	...	120
MEERUT	...	{	1 Battery of Royal Horse Artillery	...	...	78
			$\frac{3}{4}$ Regiment of Native Cavalry	...	...	113
			1 " of " Infantry	...	...	44
			Total	...	...	235
DELHI	...	$\frac{1}{2}$	Regiment of British Infantry	...	...	49
AGRA	...	{	$\frac{1}{8}$ Regiment of Native Cavalry...	...	...	22
			1 " of " Infantry	...	...	44
			Total	...	...	66
CAWNPOOR	...	{	1 Battery of Field Artillery ...	...	...	62
			1 Regiment of Native Cavalry...	...	...	135
			1 " of " Infantry	...	...	44
			Total	...	...	241

9. There are one or two points to be considered with reference to the time it would take to prepare trains for the conveyance of troops:—

1st.—Supposing ordinary traffic be not interfered with;

2nd.—Supposing all civil traffic to be stopped, and the resources of the several lines placed entirely at the disposal of the Military;

* One troop of Bengal Cavalry is at present at Jullundur.

3rd.—Supposing the trains to be made up as usual of 1st, 2nd and 3rd class carriages, horse-vans, covered wagons, &c.

4th.—Supposing that those vehicles be taken which can be supplied quickest, irrespective of the purpose for which they were originally intended.

10. It will perhaps, be sufficient for the present if we confine our calculation to the second and fourth points, for, in the event of any sudden emergency requiring the presence of troops in a certain locality, all ordinary traffic would undoubtedly be stopped, and every description of carriage would be used indiscriminately.

11. It is very necessary that the ordinary system of working the lines should be maintained, and that no attempt should be made to mass the trains at any particular station, for it must be remembered that the railways in India are worked to a great extent by a native staff, who in the event of anything being done out of the routine they are accustomed to would become confused, and accidents would ensue.

12. The usual allowance must be made for the trains to cross each other, and for obtaining the "line clear" reports; an interval of one hour is allowed for this on the Delhi and Punjab railway, except on the Mooltan Branch of the Line, where, on account of the greater distances between stations, an hour and a half is given.

13. Lighting up and preparing engines and train takes five hours.

14. Each train consists of 40 vehicles as its ordinary load, the number being increased on two or three occasions to 43, the railway authorities asserting that the extra vehicles would not practically affect the time of travelling.

The rate of speed is calculated at about 16 miles an hour.

15. When telegraphing instructions to the General Officers in Command of the Lahore, Sirhind, Meerut, and Allahabad Divisions, information should be given on the following points, *viz* :—

1st.—The number and size of the trains to be despatched from each station;

2nd.—The approximate number of troops, followers, horses, guns, &c., to be despatched, so that the several vehicles at the disposal of the railway authorities may be utilised to the utmost.

3rd.—Whether the troops are to stop *en route* for the purposes of cooking, etc.; whether they are to take cooked provisions with them for the entire journey; or whether freshly cooked provisions will be prepared for them at certain stations. In the latter case, the time to be allowed for rest and refreshment should be stated.

16. No instructions should be issued as to the order in which troops are to be despatched. This may safely be left to the local authorities, provided they clearly understand that the several corps are to reach their destination with the least possible delay.

17. In the event of a large number of troops proceeding to the Punjab at one time, they would have to get out of the trains at the Lahore terminus, and not at "Meean Meer East" Station, or the line would speedily become blocked.

18. To ensure the arrangements now proposed being carried out with accuracy, it is essential that troops should be practised in loading and unloading trains, etc. and that Staff Officers at stations on the line of rail should be in possession of detailed instructions as to the method of embarking the several arms, and the time each unit would take to enter a train.

19. The preparation of the programme for the movement of the several trains must be made by the Officers of the Quarter Master General's Department at Lahore (for the Delhi and Punjab Railway), and at Allahabad (for the East Indian Railway), in communication with the respective Traffic Managers at those Stations; and as this work will fully occupy the time of these two Officers, assistants should be appointed at the Head-quarters of the Lahore and Allahabad commands for the purpose of carrying out all other details connected with the departure and arrival of the other corps under orders for Lahore, etc.

20. In England, where practically any amount of carriages can be collected upon any one line, and where the conveniences for loading and unloading trains exist to any extent, it is calculated that, if properly conducted, the loading of troop-trains ought to be so rapid that trains should follow each other from the same station every 15 minutes for Infantry, and every 30 minutes for Cavalry and Artillery; but in India it is very improbable that trains will ever be despatched with such rapidity for the following reasons:—

1st.—The lines of rail are nearly all single, and "line clear" reports must be received before a second train can start.

2nd.—Platform accommodation is more or less limited.

3rd.—The rolling-stock maintained by the several Railway Companies is much less in proportion to the length of line than that kept up by Companies in England, so that more time would be required to concentrate a given number of vehicles at any one point, and also for their return to the despatching station after each successive trip.

4th.—More vehicles are necessary for the accommodation of soldiers, for, in addition to the extreme heat at certain seasons of the year, the distances to be travelled are so much greater

that extra space must be allowed to admit of the men taking a certain amount of rest during the journey, otherwise the trains would have to be halted for 8 out of every 24 hours.

5th.—The camp equipage used by troops in India is much more bulky, and consequently it takes more time to stow it away.

6th.—There are no doolies in England, and those in use in this country are unwieldy and difficult to pack.

7th.—A large number of Native followers accompany troops who have to be looked after and seated in the train.

8th.—The climate of India is very different, and for many months in the year British troops must be spared all unnecessary exposure to the sun, &c.

21. Under these circumstances it would not be wise to calculate on trains following one another on the lines, or on their being despatched in succession with a less interval than two hours, or on their being loaded quicker than—

By Infantry	...	...	...	2 to 3 hours.
Artillery and Cavalry	...	...	...	5 to 6 „

22. The statement* overleaf has been drawn up on the above data, and on the supposition that both the Railway and Telegraph lines are complete, and if the information furnished by the Railway authorities is to be relied upon, all the 10,000 men could arrive at Lahore within 98 hours of the receipt at Army Head-quarters of the order for the despatch of the force, with the exception of the Mountain Battery from Jutog.

* To make this Memorandum complete, a detailed statement should be attached showing the capabilities of the lines in the matter of sidings, platform, &c., &c., in fact, a sort of reconnaissance of the Railway. I have not been able to procure this information in time, but it will be collected in the Quarter Master General's Office shortly.

Statement showing the hours of departure of the troops from the

Order of arrival of trains at Lahore.	Station which troops are leaving.	Description of troops.	Number of vehicles to each train	Railway Station from which the several vehicles would be supplied.	Number of hours in which engines could be lighted, and trains ready to be despatched from station of supply with "line clear."	Number of hours in transit of empty train to station of despatch.
1	Jullundur ...	Battery of Field Artillery ...	40	Jullundur ...	5	Nil.
2	" ... {	British Infantry...	22 19	5 at Jullundur ... 36 from Phillour ...	Nil. 5	Nil. 1
3	" ... {	" " " ...	40	26 " ... 14 from Lahore ...	7 5	1 6
4	Mooltan ...	Battery of Field Artillery ...	40	Mooltan ...	7	Nil.
5	Umballa ...	" , Royal Horse...	40	Umballa ...	5	Nil.
6	Jullundur... {	British Infantry... Native " ...	38 2	Lahore ...	9	6
7	Umballa ... {	Batty. Royal Horse Artillery ... British Infantry ...	38 2	Umballa ...	7	Nil.
8	Jullundur ...	Native " ...	42	Lahore ...	11	6
9	Meerut ...	" " ...	40	20 at Meerut ...	Nil.	Nil.
10	Umballa ...	British Infantry...	40	20 from Ghazeeabad Loodianah ...	5 5	2 5
11	Meerut ...	Native " ...	4	31 from Ghazeeabad	7	2
12	Umballa ...	" Cavalry ...	37	10 from Saharunpoor	5	3
13	Meerut ...	British Infantry...	40	Loodianah ...	7	5
14	Mooltan ...	Native Cavalry ...	40	20 from Saharunpoor 20 from Ghazeeabad 20 from Montgomery	7 9 Nil.	3 2 13+
15	Umballa ... {	British Infantry... " Cavalry...	15 25	Loodianah ...	13 9	5
16	Meerut ... {	Native " ... Batty. Royal Horse Artillery ...	13 27	Ghazeeabad ...	11	2
17	Agra ...	Native Infantry...	40	Agra ...	5	Nil.
18	Umballa ...	British Cavalry ...	40	Loodianah ...	11	5
19	Meerut ...	Batty. Royal Horse Artillery ...	40	Gazeeabad ...	13	2
20	Agra ... {	Native Infantry... Native Cavalry ...	4 37	Agra ...	7	Nil.
21	Umballa ...	British " ...	40	Loodianah ...	13	5
22	Agra ...	Native " ...	8	Agra ...	9	Nil.
	Meerut ...	Batty. Royal Horse	11	Ghazeeabad ...	Nil.	Nil.
	Umballa ...	Arty. British Cavy.	12	Loodianah ...	15	5

several stations on the line of rail, and of arrival at Lahore.

Number of hours in which trains could be ready at station of dispatch.	Number of hours allowed for loading each train.	Number of hours after receipt of orders at Meen Meer trains would leave stations.	Number of hours trains would take in transit from station of dispatch to Lahore.	Number of hours after notice each train will arrive at Lahore.	Probable date and hour of arrival of troops at Lahore, supposing the orders to have been despatched from Simla by 12 noon on 1st of the month, and to have reached Meen Meer by 6 P. M. same day.	Number of hours after receipt of orders trains will pass through.			REMARKS.
						Meerut.	Umballa.	Jullundur.	
5	5	12*	6	18	2nd Sept., 12 noon	* No train on main lines starts before 12 hours, to allow Railway authorities to make arrangements.
6	5	14	6	20	„ 2 P. M.	...	...	...
11	5	16	6	22	„ 4 „	...	...	...
7	5	12	12	24	„ 6 „	...	...	...
5	5	14	12	26	„ 8 „	...	...	20
15	5	22	6	28	„ 10 „	...	...	...
7	6	18	12	30	„ 12 midnight.	...	...	24
17	4	26	6	32	3rd Sept., 2 A. M.	...	...	...
7	4	17	17	34	„ 4 „	...	22	28	
10	4	24	12	36	„ 6 „	...	...	30
9	5	21	17	38	„ 8 „	...	26	32	† One extra hour allowed to pick up half train at Montgomery.
12	4	28	12	40	„ 10 „	...	...	34
11	5	25	17	42	„ 12 noon	...	30	36	
26	6	32	12	44	„ 2 P. M....	...	...	...
14	6	34	12	46	„ 4 „	...	...	40
13	6	31	17	48	„ 6 „	...	36	42	
5	4	23	27	50	„ 8 „	33	38	44	
16	6	40	12	52	„ 10 „	...	...	46
15	6	37	17	54	„ 12 midnight.	...	42	48	
7	4	29	27	56	4th Sept., 2 A. M.	39	44	50	
18	6	46	12	58	„ 4 „	52	Nil.
9	5	33	27	60	„ 6 „	43	4	54	
20	5	48							

Statement showing the hours of departure of the troops from the

Order of arrival of trains at Lahore.	Station which troops are leaving.	Description of troops.	Number of vehicles to each train.	Railway Station from which the several vehicles would be supplied.	Number of hours in which engines could be lighted, and trains ready to be despatched from station of supply with "line clear." Number of hours in transit of empty train to station of despatch.	
23	Umballa ...	British Cavalry...	41	Lahore	17	12
24	" ...	Native Infantry...	40	Loodianah	17	5
25	" ... }	Native Cavalry...	4 } 37 }	Phillour	9	7
26	" ...	" ...	40	"	11	7
27	Cawnpoor ...	Native Infantry...	40	Allahabad	5	7
28	Umballa ...	" Cavalry ...	40	Phillour	13	7
29	Cawnpoor... }	" Infantry .. " Cavalry ...	4 } 37 }	Allahabad	7	7
30	Delhi ...	British Infantry...	22	Ghazeeabad	15	1
	Umballa ...	Native Cavalry...	18	Lahore	19	12
31	Cawnpoor ...	" ...	40	Allahabad	9	7
32	Delhi ...	British Infantry,	27	Ghazeeabad	17	1
33	Cawnpoor ...	Native Cavalry...	40	Allahabad	11	7
34	" ... }	Batty. Field Arty.	18 } 22 }	"	13	7
35	" ...	" " ...	40	"	15	7
36	Saharunpoor }	3 Cos. Sappers and Miners ..	28 }	Saharunpoor ...	9	Nil
		British Infantry ..	12 }			
37	" ... }	Native Infantry...	36 } 4 }	"	11	"
38	" ...	" ...	40	"	13	"
39	Umballa ...	Batty. Mountain Artillery ...	39	Umballa ... ..	...	"
1	Mooltan ... }	" Field Arty. ...	22 }	Mooltan	5	"
		Native Cavalry ...	18 }			
2	" ...	" ...	...	See No. 4 above ...	...	...
3	" ...	Native Cavalry ...	40	Montgomery ...	5	6
4	" ... }	Native Infantry...	37 } 4 }	Lahore	7	12
5	" ...	" ...	...	See No. 14 above ...	...	...
6	" ...	Native Infantry...	40	Lahore	15	12

several stations on the line of rail, and of arrival at Lahore.

Number of hours in which train could be ready at station of dispatch.	Number of hours allowed for loading each train.	Number of hours after receipt of orders at Meean Meer trains would leave stations.	Number of hours trains would take in transit from station of despatch to Lahore.	Number of hours after notice each train will arrive at Lahore.	Probable date and hour of arrival of troops at Lahore, supposing the orders to have been despatched from Simla by 12 noon on 1st of the month, and to have reached Meean Meer by 6 P. M. same day.	Number of hours after receipt of orders trains will pass through.			REMARKS.
						Meerut.	Umballa.	Jullunder.	
29	6	50	12	62	„ 8 „ ...	...	...	56	
22	4	52	12	64	„ 10 „ ...	...	...	58	
16	5	54	12	66	„ 12 noon ...	...	...	60	
18	5	56	12	68	„ 2 P. M. ...	...	...	62	
12	4	35	35	70	„ 4 „ ...	53	58	64	
20	6	60	13	72	„ 6 „ ...	...	...	66	
14	6	39	35	74	„ 8 „ ...	57	62	68	
16	4	56	20	76	„ 10 „ ...	59	64	70	
31	5	64	12						
16	5	43	35	78	„ 12 midnight	61	65	72	
18	4	60	20	80	5th Sept., 2 A. M.	63	68	74	
18	6	47	35	82	„ 4 „ ...	65	70	76	
20	6	49	35	84	„ 6 „ ...	67	72	78	
22	6	51	35	86	„ 8 „ ...	69	74	80	
9	4	73	15	88	„ 10 „ ...	...	76	82	
11	4	75	15	90	„ 12 noon ...	...	78	84	
13	4	77	15	92	„ 2 P. M. ...	...	80	86	
*	6	138	12	150	7th Sept., 12 mid- night.	...	...	144	* First train return- ing to Umballa. Unloads at Meean Meer, West.
5	5	10	12	22	2nd Sept., 4 P. M.	...	...	...
...	
11	4	15	12	27	2nd Sept., 9 P. M.	...	...	...	} Ditto.
19	4	24	12	36	3rd „ 6 A. M.	...	...	...
...	...	...	...	...	.....	...	...	...	} Ditto.
27	4	34	12	46	3rd Sept., 4 P. M.	...	...	...

23. It will be interesting now to ascertain in what number of days the troops thus removed from the stations on the line of rail could be replaced, for it will be always necessary to hold Mooltan, Jullunder, Umballa, and Meerut in force, and in the event of troops being called away from any of these stations to meet a sudden emergency, their places must be taken by others as quickly as possible.

ARTILLERY.

24. Mooltan and Jullundur are the only two stations deprived altogether of Field Artillery, but as a Battery of Horse Artillery would remain in Umballa, and a Battery of Field Artillery at Ferozpoor, Jullundur might, for a time, be left without guns, but a Battery must be sent to Mooltan ; and this we might with safety take from Meerut, where there would still be two Batteries left, viz., one of Horse, and one of Field Artillery.

The order for the move of this Battery would reach Meerut on the evening of 1st September, and as Movable Column carriage would be available after a few hours' notice, and the resources of a large city would be at the disposal of the authorities, the Battery should be able to leave by route march the following morning, and, proceeding by route No. 458, should reach Umballa, a distance of 133 miles, on the 6th, by which time rail transport could be in readiness, which would take the Battery to Mooltan by the 7th September.

25. In the event of the re-occupation of Jullundur by Artillery a Battery could be brought either from Seetapore or Benares ; if from Seetapore, and pending the completion of the Oudh and Rohilkhund Railway, the Battery would have to march to Cawnpoor, distant 103 miles, and there take rail ; but if the Benares Battery were taken, it could start by rail at 1 P. M. on the 3rd, and, passing Cawnpoor at 3 A. M. on the 4th, be at Jullundur at 8 A. M. on the 5th September.

BRITISH CAVALRY.

26. It would probably be considered advisable to move a wing, if not the whole, of the British Cavalry Regiment from Meerut to Umballa ; it would accompany the Battery and arrive at Umballa on the 6th September. Should the withdrawal of so many troops from Meerut at the same time be thought inexpedient, a wing of the Cavalry Corps at Muttra might be brought to Umballa ; but in the first place, the distance is greater, 217 miles against 133 miles, and in the second, the Muttra Corps may be at any moment required for service in Rajpootana or Gwalior. Indeed, in the event of any serious or lengthened outbreak on the North West Frontier, it is very possible the Regiment would be marched without delay to Morar, where the insalubrity of the climate alone prevent its being permanently located. We must, therefore look to Meerut for assistance ; but when we consider that the only other Regiment of British Cavalry in Bengal towards the south and east is at Lucknow, distant 286 miles, it may be thought that the removal of a Wing to Umballa would be sufficient.

BRITISH INFANTRY.

27. To replace the three regiments of British Infantry, the Corps at Dugshai, Subathoo, and Chukrata are most conveniently situated, the only drawback being that in all hill localities the collection of a sufficiency of carriage to move a large number of men at short notice is always a difficult matter. According to a calculation made by the Commissariat Department, it would take eight or ten days before the regiments could start; but when we remember that in May 1857 three regiments* left Kussowlie, Subathoo and Dugshai at a few hours' notice and reached Umballa, distant 47, 62, and 56 miles, respectively, the first Corps (the 1st Fusiliers) in 44 hours, and the last (the 2nd Fusiliers) in about 60 hours, after the receipt of intelligence at Simla of the mutineers from Meerut having reached Delhi, and that in those days there was no telegraphic communication either between Umballa and Simla, or between Simla and the hill stations, and that, moreover, there was no Movable Column carriage held in readiness within a short distance of Umballa as is the case now, we may safely calculate on being able to move the two regiments from Dugshai and Subathoo on the morning of the 3rd and on their reaching Umballa on the 5th September, where one Corps would go into quarters, while the other proceeding onward by rail would reach Jullundur the same evening.

28. There must necessarily be more delay in bringing the regiment down from Chukrata; the telegraphic wire ceases at Landour, from whence the order would have to be sent by special messenger, a distance of 40 miles, and would not reach Chukrata before 10 A. M. on the 2nd; there carts and coolies are much more scarce than in the Simla Hills, so that it is doubtful if the regiment would be able to march before the morning of the 5th, in which case one Wing would reach Roorkee, distant 96 miles on the 9th, while the other Wing would be at Saharunpore, distant 79½ miles, on the 8th September, and at Deibi the same night.

BENGAL CAVALRY.

29. After withdrawing a regiment of Native Cavalry from Cawnpore, only nine regiments would be left south of the Sutlej, and these are scattered over such a vast extent of country† that it is not easy to say which could best be spared; the one from Bareilly could reach Meerut in the shortest time, but as Rohilkhund cannot be left without Cavalry, it would be necessary to bring on the two Squadrons from Seetapoor. The Corps would be ordered by telegraph, and would be able to leave Bareilly on the morning of the 2nd, and marching 25 miles

* 57th Foot, 1st and 2nd Bengal Fusiliers.

† 1 Regiment at Bareilly and Moradabad.	1 Regiment at Deoli and Jhansie.
1 " at Seetapoor and Fyzabad.	1 " at Nowgong and Banda.
1 " at Lucknow.	1 " at Saugor.
1 " at Allahabad and Barrackpoor.	1 " at Segowlie.
1 " at Morar.	

a day, would reach Meerut, distant 130 miles, on the 6th, where a Wing might remain, the other Wing, proceeding on by rail, would reach Umballa by the morning of the 7th September.

30. There is no Telegraph Office at Seetapoor, but as the post leaves Lucknow daily at 5 P. M., and as Seetapoor is distant only 55 miles, the order would reach the two Squadrons by day-break on the 2nd, and before noon they would be able to march for Bareilly, distant only 101 miles, where they would arrive on the 5th September.

NATIVE INFANTRY.

31. The following regiments of Native Infantry could be brought up to take the places of Corps ordered onwards, viz. :—

* 4th Goorkhas	from	Bukloh	to	Mooltan.
1st	"	"	Dhurmsala	to Jullundur.
3rd	"	"	Almorah	to Meerut.
N. I. Regiment	"	"	Lucknow	to Umballa.

32. There is no telegraph to Bukloh, and as the mail leaves Meean Meer daily at 11. A. M., and takes 26 hours in reaching Bukloh, the order would not arrive at that station until 2 or 3 P. M. on the 3rd September; it would then take five or six days to collect carriages sufficient to move the regiments, which would not be able to start before the morning of the 9th. Umritsur is 103 miles from Bukloh, so that it would be the 13th before the regiment could reach there, and the morning of the 14th September before it could be at Mooltan.

33. The order for the march of the 1st Goorkhas would reach Dhurmsala about noon on the 3rd, and as the regiment could be equipped with carriage in four days, it would be able to start on the morning of the 7th, and would reach Jullundur, distant 102 miles, on the 11th September.

34. There is no telegraphic communication with Almorah nearer than Nynee Tal, distant 31 miles, so that, if even the ordinary post, which leaves Nynee Tal daily at 6 P. M., were anticipated, the order for the march would not reach the regiment before day break on the 2nd. It is reported that 36 hours' notice would be required before the Corps could start, but in all probability it would take 48 hours; it would therefore, be the 4th before a start was made, and the 12th September before Meerut, distant 168 miles, could be reached.

35. The regiment at Lucknow would be able to start on the morning of the 2nd September by rail, but, in order not to interfere with the programme laid down for the troops proceeding direct to Lahore, its departure would have to be deferred until 12 P. M. on the

* In the event of a disturbance on the Frontier, the Goorkha Regiments at Bukloh and Dhurmsala would doubtless, be marched toward the scene of operations direct *via* Sealkote : but as explained before Corps on the line of rail have been taken in order to test the capabilities of the railway.

3rd, as it could not leave Cawnpore until 59 hours after the receipt at Meer Meer of the intelligence of the proposed move of troops or until 5 A. M. on the 4th September, by which arrangement it would reach Umballa at 4 A. M. on the 5th September.

FRED. ROBERTS, *Lieut-Col.*,

Dpty. Quarter Master General.

QUARTER MASTER GENERAL'S OFFICE,

ARMY HEAD QUARTERS, SIMLA ;

The 5th October 1872.

V.

Memorandum comparing the relative capabilities of the broad and narrow gauge railways for the purposes of military transport, also showing under what circumstances troops could march quicker than be conveyed by either of these railways.

1. A previous Memorandum (a) showed the time in which a force of 10,000 men could be

(a) By the Deputy Quarter Master General, dated 5th October 1872.

transported by railway to Lahore from the several military stations on or near the line of railway, and as the termini of the broad and narrow gauges are both placed at Lahore, it will be convenient if we continue the movement discussed in that Memorandum, and ascertain in what time these same troops could be forwarded on to Rawulpindee and Kurrachee—

1st.—By the broad gauge.

2nd.—By the narrow gauge.

3rd.—By route marching.

From these calculations a law will be deduced showing the distance to which troops can march more expeditiously than they can be conveyed by either the broad or narrow gauge railways in India.

2. Owing to the large amount of rolling-stock possessed by the broad gauge railways and to the fact that the vehicles of one line can be used on any other, it was found that the 43 trains required to convey the whole force* could be despatched so that each train would reach Lahore in succession every two hours.

	Men.
* 1 Regiment of British Cavalry ...	450
3 " " Infantry ...	2,628
4 " Native Cavalry ...	1,760
7 " " Infantry ...	5,012
3 Companies of Sappers and Miners ...	336
Total ...	<u>10,186</u>

with 2 Batteries of Royal Horse Artillery,
3 " Field Artillery,

1 Battery of Mountain Artillery,
making a total of 11,510 combatants.

(a) Of these 2,837
travel with the
horses, ponies, &c.,
and not in the pas-
senger carriages.

10,989 Followers. (a)
3,268 Horses.
1,679 Ponies and Mules.
184 Bullocks, and
36 Guns,

besides

12,759 maunds 20 seers baggage.

9,501 " 33 " camp equipage.

303 " 30 " Royal Engineers' equipment.

State Railway line, would consist of the same number and description of vehicles, and would travel onwards from Lahore under exactly the same circumstances as it arrived there.

3. In considering the broad gauge movement therefore, it will only be necessary to carry on the time-table to Rawulpindee or Kurrachee, as each train, on being transferred to the

4. A short halt at Lahore would probably be necessary, not perhaps for the first arrivals, who would only have been a few hours in the train, and could be pushed through to Rawulpindee, or even Kurrachee, but for the troops from a distance who would require rest and time to cook ; so if six hours be allowed to all, the trains would be able to leave Lahore in the order of arrival, and at intervals of two hours.

5. There can be no doubt that, having an uniform broad gauge,

MEMORANDUM.

1st Class.—23 carriages are required ; we have, including composite and reserve, 45.

2nd and 3rd Class.—272 second and 166 third class, or a total of 438 vehicles are required ; we have 35 second and 220 third, or a total of 255, so that, presuming third class carriages are made use of instead of second class, we are 183 short, and that number would have to be returned from Lahore to be re-loaded.

Double Horse-boxes, Cattle-trucks and Covered Goods Wagons.—429 Double horse-boxes, 150 cattle-trucks and 219 covered goods wagons, or a total of 798 vehicles are required. Against this we have 26 single, and 2 double horse-boxes, 50 high-sided trucks and 1,300 covered goods wagons, or a total of 1,378, so that by making use of covered goods-trucks we should be able to meet requirements in the first instance. Some of the planks of the covered goods wagons would have to be taken out for ventilation, as was done when conveying horses from Delhi during the Kooka disturbance.

Low-sided trucks.—48 low-sided trucks are required, and we have 285 available, without including 10 timber trucks, and 50 six-wheeled trucks.

Powder-vans.—17 Powder-vans are required : we have only 11, and as it might not be desirable to use covered trucks, these would have to be returned to re-load.

Engine-power and Brake van.—Of engine-power and brake-vans we have more than sufficient.

JOSEPH HARRISON,
Acting Agent.

resources of the Delhi and Punjab Railway would probably admit of this being done without any assistance from the vehicles of the State Railways ; as will be seen by reference to the margin of the preceding paragraph, where the Agent of that Railway states : “ Of engine-power and brake-vans we have more than sufficient.”

7. Practically, therefore, nearly the whole of the Government rolling-stock would be available for other requirements, and could be despatched to Kurrachee or Allahabad to assist in bringing up more troops or stores—a matter of considerable importance—for it must be remembered, that if ever it becomes necessary to repel an invasion, or to meet a general rising of the frontier tribes, a force of 10,000 men would be scarcely sufficient to strengthen the garrisons, which extend from Abbotabad to Rajanpore, a distance of 570 miles ; and more men, to say nothing of stores and munitions of war, would have to be rapidly brought up from the Madras and Bombay Presidencies, and the lower part of Bengal.

this rate of travelling could be accomplished, for it will be seen from the statement given in the margin, that, by indenting on the Punjab Northern, and Indus Valley (State) Railways for 183 second or third class carriages and 6 powder-vans, the Delhi and Punjab Railway could transport all the troops of this force stationed north of Ghazeeabad with the resources at their own disposal.

6. On the Lahore-Rawalpindee Section, it would probably be necessary to attach a second engine and an extra brake-van to each train north-west of Jhelum, on account of the heavy gradients ; but the re-

8. Troops would be required, not only to place a fairly sized army in the field, but to reinforce such places as Morar, Agra, Delhi, Umballa, Jullundur, Umritsur and Lahore, all of which would certainly have to be held in strength, if there were any serious or prolonged disturbance on the frontier. To effect this within any reasonable time, it is highly desirable, that when once the trains have been loaded, the troops and stores may be conveyed to their destination without having to change carriages, which can only be secured by all the railways being constructed on an uniform gauge.

9. If the above conditions are fulfilled, and the rate of travelling be $15\frac{1}{2}$ miles an hour, including stoppages, the first train (see Appendix B) would leave Lahore at 6 P. M. on the 2nd September, and reach Rawulpindee, distant 171 miles, at 5 A. M. the next morning; while the last train, leaving Lahore at 6 A. M. on the 6th September, would arrive at Rawulpindee at 5 P. M. the same day. From which it appears that the 10,000 men, with guns, horses, tents, baggage, &c., complete, could be assembled at Rawulpindee in 101 hours after the first detachment reached Lahore, and the last of the 43 trains could be back at Lahore by* 1 P. M. on the 7th September, ready for any further work that might be required; indeed, by that time, the first 20 trains could have travelled down the line as far as Allahabad if necessary.

10. The time required for the transport of the same force to Kurrachee, distant 802 miles would be 5 days 22 hours, as the last train would reach that place at 10 A. M. on the 8th September.

11. The movement by the narrow gauge railway will now be considered.

* Reaches Rawulpindee at	...	...	5 P. M. on the 6th.
Unloaded at	...	...	10 P. M. " "
Cleaned, examined, and repaired at	...	...	11 P. M. " "
Reaches Lahore (about 13 miles an hour) at	...	12 noon	" 7th
Cleaned, examined, and repaired at	...	1 P. M.	" "

12. The Consulting Engineer to Government for State Railways, in a Memorandum, dated 29th April 1873, gives the capacity of the several vehicles, and the proposed normal rolling-stock of the Punjab Northern and Indus Valley (State) Railways as follows:—

PROPOSED NORMAL ROLL- ING-STOCK.		Capacity of the several vehicles.	
Punjab North- ern (State) Rail- way.	Indus Valley (State) Rail- way.		
8	25	1st class ...	6 Officers.
8	25	2nd " ...	18 Soldiers.
46	140	3rd " ...	15 Soldiers or 30 followers.
7	20	Horse-vans ...	2 Horses.
265	775	Cattle-trucks ...	6 Ponies or bullocks.
100	325	Covered wagons ...	60 Maunds.
2	5	Open Wagons ...	3 to 2 of the broad gauge.
12	35	Powder-vans ...	Practically of same capa- city as broad gauge.
		Brake-vans ...	23 Maunds.

13. Mr. Molesworth then suggests certain conditions under which the movement from Lahore to Rawulpindee might be carried out, and states that—"if the ordinary stock alone be used, it will require with—

6 trains per day each way	...	...	13 days.
10 " " "	...	...	8 "
12 " " "	...	...	6½ "

If, however, a reserve of special trucks be kept for the transport of horses, the time required will be—

With 6 trains per day	...	...	8½ days.
" 10 " " "	...	...	5 "
" 12 " " "	...	...	4½ "

exclusive of the time taken in transport."

14. It becomes necessary, therefore, to consider the narrow gauge movement under these several conditions; and to calculate for each case the time that would be occupied in transport, and the necessary increase to the normal rolling-stock.

15. It will, perhaps, be sufficient for our purpose if we consider only four of the six conditions given by Mr. Molesworth, *viz.*, the first and last in each case; the rate of travelling will be common to all, 12 miles an hour for troops, including stoppages, and about 10 miles an hour for return trains; thus requiring 14 hours for the journey to, and 17 hours from Rawulpindee.

16. *First condition.*—If the ordinary stock alone be used, and 6 trains be despatched each way daily.

17. The troops commence arriving at Lahore at 12 noon on the 2nd September, see para. 22 of Memorandum, dated 5th October 1872, copy annexed. The Artillery brought in No. 1 train could not leave again until 4 A. M. on the 3rd, as five hours would be spent in unloading the broad, and the same time in loading the narrow gauge vehicles, to which must be added six hours for rest and refreshment, the least that could be allowed after the heavy work imposed on the troops by the break of gauge; for the same reasons the troops of No. 2 train could not leave before 6 A. M. on the 3rd, but the Infantry in No. 3 train would be able to start* 11 hours after arrival at Lahore, or at 3 A. M. on the 3rd September; their train would then become No. 1 of the narrow gauge (Appendix C), and would reach Rawulpindee at 5 P. M. the same day.

* Unloading broad, loading narrow gauge	...	...	5 hours.
Rest and refreshment	...	...	6 "
			<hr/>
Total	...		11
			<hr/>

18. *Seventy-four double† trains of 50 vehicles each, or a total of 3,693 vehicles, would be required for the transport of the force (Appendices A and C), and of these, 11 trains, or 550 vehicles, would have to be in readiness at Lahore, as it would take 40‡ hours before No. 1, an Infantry train, could return to Lahore and re-load, and 43§ hours before No. 2, an Artillery train, could do the same; therefore, trains Nos. 1 to 10 and No. 12 would have to be collected at Lahore.

19. By referring to the Time-table, Appendix C, it will be observed that the last train would not leave Lahore until 7 A. M. on the 15th September, reaching Rawulpindee at 9 P. M. the same day, so that, counting from the time of the arrival of the first detachment at Lahore, a period of 321 hours, or 13½ days nearly, would be required to convey the 10,000 men by the narrow gauge railway from Lahore to Rawulpindee, against 101 hours, or 4¼ days, by the broad gauge; the time spent in actual travelling being respectively, 306 and 95 hours.

20. Before this movement could be accomplished, it would be necessary to add certain vehicles to the rolling-stock of the Punjab Northern (State) Railway, as will be seen from the following statement:—

	1st class.	2nd class.	3rd class.	Horse-vans and cattle trucks.	Covered wagons.	Open wagons.	Powder-vans.	Brake-vans.
Normal rolling-stock of the Punjab Northern (State) Railway	8	8	46	7	265	100	2	12
Vehicles required to compose the 11 trains at Lahore (2 horses in a van), plus 30 ¶ per cent. for those under repair	10	100	72	329	82	47	1	74
Difference	—2	—92	—26	—322	+183	+53	+1	—62

* Mr. Molesworth calculates that 78 double trains will be required, but he appears not to have loaded his brake-vans, a large number of which are required for each train.

† A double train means that two engines would be required for each train.

‡ Travelling to Rawulpindee 14 hours.

Unloading Infantry train 2 "

Examining, cleaning, and repairing carriages 1 hour.

Travelling back to Lahore 17 hours.

Examining, cleaning and repairing carriages 1 hour.

Loading Native Cavalry 5 hours.

Total 40 hours.

§ Three more hours being required to unload an Artillery train.

¶ It would probably be sufficient if 15 per cent. were allowed for vehicles under repair.

which shows that—

2 First class,
118 Second or third class,
130 Covered wagons or cattle trucks, and
62 Brake-vans,

or a total of 321 vehicles would be required, while 53 open wagons and 1 powder-van would be surplus. The powder-van could no doubt, be made use of, but no account can be taken of the 53 open wagons, as these are of little or no use, except for the transport of guns and wagons (all of which have been already provided for,) the danger from fire being so great that nothing inflammable could be placed in them. There are then 320 vehicles* deficient under this condition.

21. *Second condition.*—If the ordinary stock alone be used, and 12 trains be despatched each way daily.

22. From reference to the Time-table (Appendix C), it appears that, with two hours' intervals, the 74th train would have its place between the 37th and 38th train of the four hours' interval, and would leave Lahore at 5 A. M. on the 9th September, reaching Rawulpindee at 7 P. M. the same day; counting, therefore, from the time of the arrival of the first detachment at Lahore, a period of 175 hours, or seven days and seven hours, would be required to convey the force to Rawulpindee.

23. The amount of rolling-stock however, which would be necessary to admit of this movement being performed by a narrow gauge railway in so short time, is very considerable.

24. From para. 18 it appears that 40 and 43 hours would elapse before trains Nos. 1 and 2 trains, respectively, could return to Lahore and re-load; therefore trains Nos. 1 to 20 and 22 would have to be in readiness at Lahore, would necessitate the normal rolling-stock of the Punjab Northern (State) Railway being increased by—

5 First class,
171 Second or third class,
376 Covered wagons, or cattle trucks,
96 Brake-vans,

or a total of 842 vehicles, allowing 30 per cent. for those under repair.

25. *Third condition.*—If special trucks be constructed for carrying four instead of two horses, and six trains be despatched each way daily.

26. The total number of horses with the force amounts to 3,268

* No calculation has been made of the number of engines that would be required as the demand for these, as pilot engines, and for local shunting work, is not known, but a very considerable increase would be necessary, as the nominal number in stock is only 140 both on the Indus Valley and Punjab Northern (State) Railways.

require about 80 brakes, which
 aunds ; in place of these 80 brakes,
 wagons must be given, so that the
 icles will be $817 + 80 - 31 = 866$.

which at 4 per truck, will
 require 817 vehicles in-
 stead of 1,634 as previously
 calculated, thus effecting
 a reduction of 866 (a)

7 trains. It will, therefore, be necessary, under these
 arrange for 74—17 or 57 trains travelling between
 lpindee.

me-table (Appendix D) shows that the last or 57th
 Lahore at 11 A. M. on the 12th September, and reach
 o'clock the following morning ; the movement under
 ld, therefore, take 253 hours, or 10 days, 13 hours.

number and description of vehicles required, in excess
 ing-stock of the Punjab Northern (State) Railway,
 s :—

	1st class.	2nd class.	3rd class.	Horse-vans and cattle trucks.	Covered wagons.	Open wagons.	Powder-vans.	Brake-vans.
... of the n (State)	8	8	46	7	265	100	2	12
r the 11 horses in cent. for	12	105	78	304	92	49	2	73
... ..	-4	-97	-32	-297	+173	+51	—	-61

18 vehicles deficient.

condition.—If special trucks be constructed for
 ad of two horses, and 12 trains be despatched each way

ase, the 57th train would start at the time fixed for
 he Time-table (Appendix D), and, leaving Lahore
 th September, would reach Rawulpindee at 9 A. M.
 movement thus taking 141 hours, or nearly six days.

n in para. 24, train Nos. 1 to 20 and 22 would have
 at Lahore, requiring an increase to the nominal rolling.
 b Northern (State) Railway of—

V.

Memorandum comparing the relative capabilities of the broad and narrow gauge railways for the purposes of military transport, also showing under what circumstances troops could march quicker than be conveyed by either of these railways.

1. A previous Memorandum (a) showed the time in which a force of 10,000 men could be transported by railway to Lahore from the several military stations on or near the line of railway, and as the termini of the broad and narrow gauges are both placed at Lahore, it will be convenient if we continue the movement discussed in that Memorandum, and ascertain in what time these same troops could be forwarded on to Rawulpindee and Kurrachee—

1st.—By the broad gauge.

2nd.—By the narrow gauge.

3rd.—By route marching.

From these calculations a law will be deduced showing the distance to which troops can march more expeditiously than they can be conveyed by either the broad or narrow gauge railways in India.

2. Owing to the large amount of rolling-stock possessed by the broad gauge railways and to the fact that the vehicles of one line can be used on any other, it was found that the 43 trains required to convey the whole force* could be despatched so that each train would reach Lahore in succession every two hours.

	Men.
* 1 Regiment of British Cavalry ...	450
3 " " Infantry ...	2,628
4 " Native Cavalry ...	1,760
7 " " Infantry ...	5,012
3 Companies of Sappers and Miners ...	336
Total ...	10,186

with 2 Batteries of Royal Horse Artillery,
3 " " Field Artillery,
1 Battery of Mountain Artillery,
making a total of 11,510 combatants.

(a) Of these 2,837 10,989 Followers. (a)
travel with the 3,268 Horses.
horses, ponies, &c., 1,679 Ponies and Mules.
and not in the pas- 184 Bullocks, and
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State Railway line, would consist of the same number and description of vehicles, and would travel onwards from Lahore under exactly the same circumstances as it arrived there.

3. In considering the broad gauge movement therefore, it will only be necessary to carry on the time-table to Rawulpindee or Kurrachee, as each train, on being transferred to the

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1 Battery of Mountain Artillery,
making a total of 11,510 combatants.

(a) Of these 2,837 travel with the horses, ponies, &c., and not in the passenger carriages.

besides

12,759 maunds 20 seers baggage.

9,501 " 33 " camp equipage.

303 " 30 " Royal Engineers' equipment.

3. In considering the broad gauge movement therefore, it will only be necessary to carry on the time-table to Rawulpindee or Kurrachee, as each train, on being transferred to the

State Railway line, would consist of the same number and description of vehicles, and would travel onwards from Lahore under exactly the same circumstances as it arrived there.

V.

Memorandum comparing the relative capabilities of the broad and narrow gauge railways for the purposes of military transport, also showing under what circumstances troops could march quicker than be conveyed by either of these railways.

1. A previous Memorandum (a) showed the time in which a force of 10,000 men could be transported by railway to Lahore from the several military stations on or near the line of railway, and as the termini of the broad and narrow gauges are both placed at Lahore, it will be convenient if we continue the movement discussed in that Memorandum, and ascertain in what time these same troops could be forwarded on to Rawulpindee and Kurrachee—

1st.—By the broad gauge.

2nd.—By the narrow gauge.

3rd.—By route marching.

From these calculations a law will be deduced showing the distance to which troops can march more expeditiously than they can be conveyed by either the broad or narrow gauge railways in India.

2. Owing to the large amount of rolling-stock possessed by the broad gauge railways and to the fact that the vehicles of one line can be used on any other, it was found that the 43 trains required to convey the whole force* could be despatched so that each train would reach Lahore in succession every two hours.

	Men
* 1 Regiment of British Cavalry ...	450
3 " " Infantry ...	2,628
4 " Native Cavalry ...	1,760
7 " " Infantry ...	5,012
3 Companies of Sappers and Miners ...	336
Total ...	10,186

with 2 Batteries of Royal Horse Artillery,
3 " Field Artillery,

1 Battery of Mountain Artillery,
making a total of 11,510 combatants.

(a) Of these 2,837 10,989 Followers. (a)
travel with the 3,268 Horses.
horses, ponies, &c., 1,679 Ponies and Mules.
and not in the pas- 184 Bullocks, and
senger carriages. 36 Guns,

besides
12,759 maunds 20 seers baggage.

9,501 " 33 " camp equipage.

303 " 30 " Royal Engineers' equipment.

State Railway line, would consist of the same number and description of vehicles, and would travel onwards from Lahore under exactly the same circumstances as it arrived there.

3. In considering the broad gauge movement therefore, it will only be necessary to carry on the time-table to Rawulpindee or Kurrachee, as each train, on being transferred to the

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Memorandum comparing the relative capabilities of the broad and narrow gauge railways for the purposes of military transport, also showing under what circumstances troops could march quicker than be conveyed by either of these railways.

1. A previous Memorandum (a) showed the time in which a force of 10,000 men could be transported by railway to Lahore from the several military stations on or near the line of railway, and as the termini of the broad and narrow gauges are both placed at Lahore, it will be convenient if we continue the movement discussed in that Memorandum, and ascertain in what time these same troops could be forwarded on to Rawulpindee and Kurrachee—

1st.—By the broad gauge.

2nd.—By the narrow gauge.

3rd.—By route marching.

From these calculations a law will be deduced showing the distance to which troops can march more expeditiously than they can be conveyed by either the broad or narrow gauge railways in India.

2. Owing to the large amount of rolling-stock possessed by the broad gauge railways and to the fact that the vehicles of one line can be used on any other, it was found that the 43 trains required to convey the whole force* could be despatched so that each train would reach Lahore in succession every two hours.

* 1 Regiment of British Cavalry ...	Men.	450
3 " " Infantry ...	2,628	
4 " Native Cavalry ...	1,760	
7 " " Infantry ...	5,012	
3 Companies of Sappers and Miners ...	336	
Total ...	10,186	

with 2 Batteries of Royal Horse Artillery,
3 " " Field Artillery,
1 Battery of Mountain Artillery,
making a total of 11,510 combatants.

(a) Of these 2,837 10,989 Followers. (a)
travel with the 3,268 Horses.
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and not in the pas- 184 Bullocks, and
senger carriages. 36 Guns,

besides
12,759 maunds 20 seers baggage.
9,501 " 33 " camp equipage.
303 " 30 " Royal Engineers' equipment.

State Railway line, would consist of the same number and description of vehicles, and would travel onwards from Lahore under exactly the same circumstances as it arrived there.

3. In considering the broad gauge movement therefore, it will only be necessary to carry on the time-table to Rawulpindee or Kurrachee, as each train, on being transferred to the

V.

Comparing the relative capabilities of the broad and large railways for the purposes of military transport, and under what circumstances troops could march and be conveyed by either of these railways.

A previous Memorandum (a) showed the time in which a force of 10,000 men could be transported by railway to Lahore from the several stations on or near the line of railway, and as the termini of broad and narrow gauges are both placed at Lahore, it will now be continued in the movement discussed in that Memorandum in what time these same troops could be forwarded to Lahore and Kurrachee—

1st.—By the broad gauge.

2nd.—By the narrow gauge.

3rd.—By route marching.

From the calculations a law will be deduced showing the distance which troops can march more expeditiously than they can be conveyed by broad or narrow gauge railways in India.

From the large amount of rolling-stock possessed by the broad gauge railways and to the fact that the vehicles of one line can be used on any other, it was found that the 43 trains required to convey the whole force* could be despatched so that each train would reach Lahore in succession every two hours.

British Cavalry ...	Men- 450
„ Infantry ...	2,628
Native Cavalry ...	1,760
„ Infantry ...	5,012
Sappers and Miners ...	836
Total ...	<u>10,186</u>

Royal Horse Artillery,
Field Artillery,
Mountain Artillery,
11,510 combatants.
10,989 Followers. (a)
3,268 Horses.
1,679 Ponies and Mules.
184 Bullocks, and
36 Guns,

besides
seers baggage.
„ camp equipage.
„ Royal Engineers' equipment.

The train would consist of the same number and description of vehicles as it arrived there.

3. In considering the broad gauge movement therefore, it will only be necessary to carry on the time-table to Rawulpindee or Kurrachee, as each train, on being transferred to the

V.

Comparing the relative capabilities of the broad and large railways for the purposes of military transport, and under what circumstances troops could march and be conveyed by either of these railways.

A previous Memorandum (a) showed the time in which a force of 10,000 men could be transported by railway to Lahore from the several stations on or near the line of railway, and as the termini of broad and narrow gauges are both placed at Lahore, it will be seen that we continue the movement discussed in that Memorandum in what time these same troops could be forwarded from Lahore to Ferozepore and Kurrachee—

1st.—By the broad gauge.

2nd.—By the narrow gauge.

3rd.—By route marching.

From the calculations a law will be deduced showing the distance which troops can march more expeditiously than they can be conveyed by broad or narrow gauge railways in India.

From the large amount of rolling-stock possessed by the railways of India, it is evident that the broad gauge railways and to the fact that the vehicles of one line can be used on any other, it was found that the 43 trains required to convey the whole force* could be despatched so that each train would reach Lahore in succession every two hours.

	Men.
British Cavalry ...	450
„ Infantry ...	2,628
Native Cavalry ...	1,760
„ Infantry ...	5,012
Sappers and Miners ...	336
Total ...	<u>10,186</u>

Royal Horse Artillery,
Field Artillery,
Mountain Artillery,
11,510 combatants.
10,989 Followers. (a)
3,268 Horses.
1,679 Ponies and Mules.
184 Bullocks, and
36 Guns,

besides
seers baggage.
„ camp equipage.
„ Royal Engineers' equipment.

The train would consist of the same number and description of rolling-stock as it arrived there.

3. In considering the broad gauge movement therefore, it will only be necessary to carry on the time-table to Rawulpindee or Kurrachee, as each train, on being transferred to the

12	First class,
233	Second „
84	Third „
222	Horse-vans or covered wagons,
3	Powder-vans,
94	Brake-vans.

or a total of 842 vehicles, allowing 30 per cent. for those under repair.

32. In considering the movement of the same force from Lahore to Kurrachee, it will only be necessary to calculate the time which would be occupied in the journey, and the amount of rolling-stock the narrow gauge railway would have to maintain to perform the service; the other conditions of the problem being the same as if the troops were being conveyed to Rawulpindee, for it is understood the gauge will be uniform throughout, whether the broad or narrow be finally adopted for the Indus Valley Line.

33. *First condition.*—Kurrachee is 802 miles* from Lahore; the time of travelling by the broad gauge will be 52 hours, and by the narrow gauge 67 hours; while the empty trains of the latter line would take 81 hours† returning to Lahore, consequently, 157 hours‡ would elapse before No. 1 train could start on a second trip; by this time, 4 P. M. on the 9th September (Appendix C), 40 narrow gauge trains, or 2,000 vehicles, would have left; this number must, therefore, be in readiness at Lahore, and would be required in the following proportions :—

* Lahore to Mooltan	...	...	208 miles.
Mooltan to Kotree	...	...	489 „
Kotree to Kurrachee	...	...	105 „
		Total	802 miles.
			<hr/>
			h. m.
† From Kurrachee to Kotree	...	...	10 40
„ Kotree to Mooltan	...	...	49 20
„ Mooltan to Lahore	...	...	21 0
		Total	81 0
			<hr/>
‡ Travelling to Kurrachee	...	...	67 hours.
Unloading Infantry train	...	...	2 „
Examining, cleaning, and repairing carriages...	...	...	1 hour.
Travelling back to Lahore	...	...	81 hours.
Examining, cleaning, and repairing carriages...	...	...	1 hour.
Loading Native Cavalry	...	...	5 hours.
		Total	157 hours.

	1st class.	2nd class.	3rd class.	Horse-vans and cattle trucks.	Covered wagons.	Open wagons.	Powder-vans.	Brake-vans.
Stock of (State) ...	25	25	140	20	775	325	5	35
to com- mains at s in a r cent. repair	34	407	209	1,382	223	70	10	265
...	-9	-382	-69	-1,362	+552	+255	- 5	-230

505 vehicles to be added to the normal rolling-stock ; occupied in the movement would be 374 hours, or 15 against 142 hours, or 5 days, 22 hours by the broad

condition.—As explained in para. 22, the 74th train ore at 5 A. M. on the 9th September, or 11 hours be- could return to Lahore and reload ; the whole of the therefore, have to be collected at Lahore, requiring the this portion of the line to be increased by—

- 41 First class,
- 850 Second or third class,
- 1,987 Covered wagons or cattle trucks,
- 15 Powder-vans,
- 362 Brake-vans,

31 vehicles, allowing 30 per cent. for those under repair. ent under this condition would be performed in 228 s.

condition.—In this the number of trains is reduced the last train would leave Lahore at 11 A. M. on the 12th arrive at Kurrachee at 6 A. M. on the 15th, the move- upy 304 hours, or 12 days and 18 hours. (Appendix D.) e reason given in para. 33, it will be necessary to have ed at Lahore, the several vehicles of which would be. following proportions :—

4. A short halt at Lahore would probably be necessary, not perhaps for the first arrivals, who would only have been a few hours in the train, and could be pushed through to Rawulpindee, or even Kurrachee, but for the troops from a distance who would require rest and time to cook ; so if six hours be allowed to all, the trains would be able to leave Lahore in the order of arrival, and at intervals of two hours.

5. There can be no doubt that, having an uniform broad gauge,

MEMORANDUM.

1st Class.—23 carriages are required ; we have, including composite and reserve, 45.

2nd and 3rd Class.—272 second and 166 third class, or a total of 438 vehicles are required ; we have 35 second and 220 third, or a total of 255, so that, presuming third class carriages are made use of instead of second class, we are 183 short, and that number would have to be returned from Lahore to be re-loaded.

Double Horse-boxes, Cattle-trucks and Covered Goods Wagons.—429 Double horse-boxes, 150 cattle-trucks and 219 covered goods wagons, or a total of 798 vehicles are required. Against this we have 26 single, and 2 double horse-boxes, 50 high-sided trucks and 1,300 covered goods wagons, or a total of 1,378, so that by making use of covered goods-trucks we should be able to meet requirements in the first instance. Some of the planks of the covered goods wagons would have to be taken out for ventilation, as was done when conveying horses from Delhi during the Kooka disturbance.

Low-sided trucks.—48 low-sided trucks are required, and we have 285 available, without including 10 timber trucks, and 50 six-wheeled trucks.

Powder-vans.—17 Powder-vans are required : we have only 11, and as it might not be desirable to use covered trucks, these would have to be returned to re-load.

Engine-power and Brake van.—Of engine-power and brake-vans we have more than sufficient.

JOSEPH HARRISON,
Acting Agent.

resources of the Delhi and Punjab Railway would probably admit of this being done without any assistance from the vehicles of the State Railways ; as will be seen by reference to the margin of the preceding paragraph, where the Agent of that Railway states : “ Of engine-power and brake-vans we have more than sufficient.”

7. Practically, therefore, nearly the whole of the Government rolling-stock would be available for other requirements, and could be despatched to Kurrachee or Allahabad to assist in bringing up more troops or stores—a matter of considerable importance—for it must be remembered, that if ever it becomes necessary to repel an invasion, or to meet a general rising of the frontier tribes, a force of 10,000 men would be scarcely sufficient to strengthen the garrisons, which extend from Abbotabad to Rajapoor, a distance of 570 miles ; and more men, to say nothing of stores and munitions of war, would have to be rapidly brought up from the Madras and Bombay Presidencies, and the lower part of Bengal.

this rate of travelling could be accomplished, for it will be seen from the statement given in the margin, that, by indenting on the Punjab Northern, and Indus Valley (State) Railways for 183 second or third class carriages and 6 powder-vans, the Delhi and Punjab Railway could transport all the troops of this force stationed north of Ghazeeabad with the resources at their own disposal.

6. On the Lahore-Rawalpindee Section, it would probably be necessary to attach a second engine and an extra brake-van to each train north-west of Jhelum, on account of the heavy gradients ; but the re-

8. Troops would be required, not only to place a fairly sized army in the field, but to reinforce such places as Morar, Agra, Delhi, Umballa, Jullundur, Umritsur and Lahore, all of which would certainly have to be held in strength, if there were any serious or prolonged disturbance on the frontier. To effect this within any reasonable time, it is highly desirable, that when once the trains have been loaded, the troops and stores may be conveyed to their destination without having to change carriages, which can only be secured by all the railways being constructed on an uniform gauge.

9. If the above conditions are fulfilled, and the rate of travelling be $15\frac{1}{2}$ miles an hour, including stoppages, the first train (see Appendix B) would leave Lahore at 6 P. M. on the 2nd September, and reach Rawulpindee, distant 171 miles, at 5 A. M. the next morning; while the last train, leaving Lahore at 6 A. M. on the 6th September, would arrive at Rawulpindee at 5 P. M. the same day. From which it appears that the 10,000 men, with guns, horses, tents, baggage, &c., complete, could be assembled at Rawulpindee in 101 hours after the first detachment reached Lahore, and the last of the 43 trains could be back at Lahore by* 1 P. M. on the 7th September, ready for any further work that might be required; indeed, by that time, the first 20 trains could have travelled down the line as far as Allahabad if necessary.

10. The time required for the transport of the same force to Kurrachee, distant 802 miles would be 5 days 22 hours, as the last train would reach that place at 10 A. M. on the 8th September.

11. The movement by the narrow gauge railway will now be considered.

* Reaches Rawulpindee at	...	...	5 P. M.	on the 6th.
Unloaded at	...	...	10 P. M.	" "
Cleaned, examined, and repaired at	...	...	11 P. M.	" "
Reaches Lahore (about 13 miles an hour) at	...	...	12 noon	" 7th
Cleaned, examined, and repaired at	...	...	1 P. M.	" "

12. The Consulting Engineer to Government for State Railways, in a Memorandum, dated 29th April 1873, gives the capacity of the several vehicles, and the proposed normal rolling-stock of the Punjab Northern and Indus Valley (State) Railways as follows:—

PROPOSED NORMAL ROLL- ING-STOCK.		Capacity of the several vehicles.	
Punjab North- ern (State) Rail- way.	Indus Valley (State) Rail- way.		
8	25	1st class ...	6 Officers.
8	25	2nd " ...	18 Soldiers.
46	140	3rd " ...	15 Soldiers or 30 followers.
7	20	Horse-vans ...	2 Horses.
265	775	Cattle-trucks ...	6 Ponies or bullocks.
100	325	Covered wagons	60 Maunds.
2	5	Open Wagons ...	3 to 2 of the broad gauge.
12	35	Powder-vans ... {	Practically of same capa- city as broad gauge.
		Brake-vans ...	23 Maunds.

13. Mr. Molesworth then suggests certain conditions under which the movement from Lahore to Rawulpindee might be carried out, and states that—"if the ordinary stock alone be used, it will require with—

6 trains per day each way	...	...	13 days.
10 " " "	...	...	8 "
12 " " "	...	...	6½ "

If, however, a reserve of special trucks be kept for the transport of horses, the time required will be—

With 6 trains per day	...	...	8½ days.
" 10 " "	...	...	5 "
" 12 " "	...	...	4½ "

exclusive of the time taken in transport."

14. It becomes necessary, therefore, to consider the narrow gauge movement under these several conditions; and to calculate for each case the time that would be occupied in transport, and the necessary increase to the normal rolling-stock.

15. It will, perhaps, be sufficient for our purpose if we consider only four of the six conditions given by Mr. Molesworth, *viz.*, the first and last in each case; the rate of travelling will be common to all, 12 miles an hour for troops, including stoppages, and about 10 miles an hour for return trains; thus requiring 14 hours for the journey to, and 17 hours from Rawulpindee.

16. *First condition.*—If the ordinary stock alone be used, and 6 trains be despatched each way daily.

17. The troops commence arriving at Lahore at 12 noon on the 2nd September, see para. 22 of Memorandum, dated 5th October 1872, copy annexed. The Artillery brought in No. 1 train could not leave again until 4 A. M. on the 3rd, as five hours would be spent in unloading the broad, and the same time in loading the narrow gauge vehicles, to which must be added six hours for rest and refreshment, the least that could be allowed after the heavy work imposed on the troops by the break of gauge; for the same reasons the troops of No. 2 train could not leave before 6 A. M. on the 3rd, but the Infantry in No. 3 train would be able to start* 11 hours after arrival at Lahore, or at 3 A. M. on the 3rd September; their train would then become No. 1 of the narrow gauge (Appendix C), and would reach Rawulpindee at 5 P. M. the same day.

* Unloading broad, loading narrow gauge	...	...	5 hours.
Rest and refreshment	...	...	6 "
			<hr/>
Total	...	...	11
			<hr/>

18. *Seventy-four double† trains of 50 vehicles each, or a total of 3,693 vehicles, would be required for the transport of the force (Appendices A and C), and of these, 11 trains, or 550 vehicles, would have to be in readiness at Lahore, as it would take 40‡ hours before No. 1, an Infantry train, could return to Lahore and re-load, and 43§ hours before No. 2, an Artillery train, could do the same; therefore, trains Nos. 1 to 10 and No. 12 would have to be collected at Lahore.

19. By referring to the Time-table, Appendix C, it will be observed that the last train would not leave Lahore until 7 A. M. on the 15th September, reaching Rawulpindee at 9 P. M. the same day, so that, counting from the time of the arrival of the first detachment at Lahore, a period of 321 hours, or 13½ days nearly, would be required to convey the 10,000 men by the narrow gauge railway from Lahore to Rawulpindee, against 101 hours, or 4¼ days, by the broad gauge; the time spent in actual travelling being respectively, 306 and 95 hours.

20. Before this movement could be accomplished, it would be necessary to add certain vehicles to the rolling-stock of the Punjab Northern (State) Railway, as will be seen from the following statement:—

	1st class.	2nd class.	3rd class.	Horse-vans and cattle trucks.	Covered wagons.	Open wagons.	Powder-vans.	Brake-vans.
Normal rolling-stock of the Punjab Northern (State) Railway	8	8	46	7	265	100	2	12
Vehicles required to compose the 11 trains at Lahore (2 horses in a van), plus 30 ¶ per cent. for those under repair	10	100	72	329	82	47	1	74
Difference ...	—2	—92	—26	—322	+183	+53	+1	—62

* Mr. Molesworth calculates that 78 double trains will be required, but he appears not to have loaded his brake-vans, a large number of which are required for each train.

† A double train means that two engines would be required for each train.

‡ Travelling to Rawulpindee 14 hours.

Unloading Infantry train 2 „

Examining, cleaning, and repairing carriages 1 hour.

Travelling back to Lahore 17 hours.

Examining, cleaning and repairing carriages 1 hour.

Loading Native Cavalry 5 hours.

Total ... 40 hours.

§ Three more hours being required to unload an Artillery train.

¶ It would probably be sufficient if 15 per cent. were allowed for vehicles under repair.

which shows that—

- 2 First class,
- 118 Second or third class,
- 130 Covered wagons or cattle trucks, and
- 62 Brake-vans,

or a total of 321 vehicles would be required, while 53 open wagons and 1 powder-van would be surplus. The powder-van could no doubt, be made use of, but no account can be taken of the 53 open wagons, as these are of little or no use, except for the transport of guns and wagons (all of which have been already provided for,) the danger from fire being so great that nothing inflammable could be placed in them. There are then 320 vehicles* deficient under this condition.

21. *Second condition.*—If the ordinary stock alone be used, and 12 trains be despatched each way daily.

22. From reference to the Time-table (Appendix C), it appears that, with two hours' intervals, the 74th train would have its place between the 37th and 38th train of the four hours' interval, and would leave Lahore at 5 A. M. on the 9th September, reaching Rawulpindee at 7 P. M. the same day; counting, therefore, from the time of the arrival of the first detachment at Lahore, a period of 175 hours, or seven days and seven hours, would be required to convey the force to Rawulpindee.

23. The amount of rolling-stock however, which would be necessary to admit of this movement being performed by a narrow gauge railway in so short time, is very considerable.

24. From para. 18 it appears that 40 and 43 hours would elapse before trains Nos. 1 and 2 trains, respectively, could return to Lahore and re-load; therefore trains Nos. 1 to 20 and 22 would have to be in readiness at Lahore, would necessitate the normal rolling-stock of the Punjab Northern (State) Railway being increased by—

- 5 First class,
- 171 Second or third class,
- 376 Covered wagons, or cattle trucks,
- 96 Brake-vans,

or a total of 842 vehicles, allowing 30 per cent. for those under repair.

25. *Third condition.*—If special trucks be constructed for carrying four instead of two horses, and six trains be despatched each way daily.

26. The total number of horses with the force amounts to 3,268

* No calculation has been made of the number of engines that would be required as the demand for these, as pilot engines, and for local shunting work, is not known, but a very considerable increase would be necessary, as the nominal number in stock is only 140 both on the Indus Valley and Punjab Northern (State) Railways.

(a) 817 horse-vans require about 80 brakes, which carry $80 \times 23 = 840$ maunds ; in place of these 80 brakes, therefore, 31 covered wagons must be given, so that the total reduction of vehicles will be $817 + 80 - 31 = 866$.

which at 4 per truck, will require 817 vehicles instead of 1,634 as previously calculated, thus effecting a reduction of 866 (a)

vehicles, or say 17 trains. It will, therefore, be necessary, under these circumstances, to arrange for 74—17 or 57 trains travelling between Lahore and Rawulpindee.

27. The Time-table (Appendix D) shows that the last or 57th train would leave Lahore at 11 A. M. on the 12th September, and reach Rawulpindee at 1 o'clock the following morning ; the movement under this condition would, therefore, take 253 hours, or 10 days, 13 hours.

28. And the number and description of vehicles required, in excess of the normal rolling-stock of the Punjab Northern (State) Railway, would be as follows :—

	1st class.	2nd class.	3rd class.	Horse-vans and cattle trucks.	Covered wagons.	Open wagons.	Powder-vans.	Brake-vans.
Normal rolling-stock of the Punjab Northern (State) Railway	8	8	46	7	265	100	2	12
Vehicles required for the 11 trains at Lahore (4 horses in a van), plus 30 per cent. for those under repair ...	12	105	78	304	92	49	2	73
Difference	—4	—97	—32	—297	+173	+51	—	—61

giving a total of 318 vehicles deficient.

29. *Fourth condition.*—If special trucks be constructed for carrying four instead of two horses, and 12 trains be despatched each way daily.

30. In this case, the 57th train would start at the time fixed for the 29th train in the Time-table (Appendix D), and, leaving Lahore at 7 P. M. on the 7th September, would reach Rawulpindee at 9 A. M. on the 8th ; the movement thus taking 141 hours, or nearly six days.

31. As shown in para. 24, train Nos. 1 to 20 and 22 would have to be in readiness at Lahore, requiring an increase to the nominal rolling-stock of the Punjab Northern (State) Railway of—

12	First class,
233	Second „
84	Third „
222	Horse-vans or covered wagons,
3	Powder-vans,
94	Brake-vans.

or a total of 842 vehicles, allowing 30 per cent. for those under repair.

32. In considering the movement of the same force from Lahore to Kurrachee, it will only be necessary to calculate the time which would be occupied in the journey, and the amount of rolling-stock the narrow gauge railway would have to maintain to perform the service; the other conditions of the problem being the same as if the troops were being conveyed to Rawulpindee, for it is understood the gauge will be uniform throughout, whether the broad or narrow be finally adopted for the Indus Valley Line.

33. *First condition*.—Kurrachee is 802 miles* from Lahore; the time of travelling by the broad gauge will be 52 hours, and by the narrow gauge 67 hours; while the empty trains of the latter line would take 81 hours† returning to Lahore, consequently, 157 hours‡ would elapse before No. 1 train could start on a second trip; by this time, 4 P. M. on the 9th September (Appendix C), 40 narrow gauge trains, or 2,000 vehicles, would have left; this number must, therefore, be in readiness at Lahore, and would be required in the following proportions:—

* Lahore to Mooltan	...	...	208 miles.
Mooltan to Kotree	...	...	489 „
Kotree to Kurrachee	...	...	105 „
		Total	802 miles.
			<hr/>
			h. m.
† From Kurrachee to Kotree	...	...	10 40
„ Kotree to Mooltan	...	...	49 20
„ Mooltan to Lahore	...	...	21 0
		Total	81 0
			<hr/>
‡ Travelling to Kurrachee	...	...	67 hours.
Unloading Infantry train	...	...	2 „
Examining, cleaning, and repairing carriages...	...	...	1 hour.
Travelling back to Lahore	...	...	81 hours.
Examining, cleaning, and repairing carriages...	...	...	1 hour.
Loading Native Cavalry	...	...	5 hours.
		Total	157 hours.

	1st class.	2nd class.	3rd class.	Horse-vans and cattle trucks.	Covered wagons.	Open wagons.	Powder-vans.	Brake-vans.
Normal rolling-stock of the Indus Valley (State) Railway	25	25	140	20	775	325	5	35
Vehicles required to compose the 40 trains at Lahore (2 horses in a van), plus 30 per cent. for those under repair	34	407	209	1,382	223	70	10	265
Difference ...	-9	-382	-69	-1,362	+552	+255	- 5	-230

or a total of 1,505 vehicles to be added to the normal rolling-stock; while the time occupied in the movement would be 374 hours, or 15 days, 14 hours, against 142 hours, or 5 days, 22 hours by the broad gauge.

34. *Second condition.*—As explained in para. 22, the 74th train would leave Lahore at 5 A. M. on the 9th September, or 11 hours before No. 1 train could return to Lahore and reload; the whole of the 74 trains would, therefore, have to be collected at Lahore, requiring the rolling-stock on this portion of the line to be increased by—

41 First class,
850 Second or third class,
1,987 Covered wagons or cattle trucks,
15 Powder-vans,
362 Brake-vans,

or a total of 4,231 vehicles, allowing 30 per cent. for those under repair.

The movement under this condition would be performed in 228 hours, or 9½ days.

35. *Third condition.*—In this the number of trains is reduced to 57, and as the last train would leave Lahore at 11 A. M. on the 12th September, and arrive at Kurrachee at 6 A. M. on the 15th, the movement would occupy 304 hours, or 12 days and 18 hours. (Appendix D.)

36. For the reason given in para. 33, it will be necessary to have 40 trains collected at Lahore, the several vehicles of which would be required in the following proportions:—

	1st class.	2nd class.	3rd class.	Horse-vans and cattle trucks.	Covered wagons.	Open wagons.	Powder-vans.	Brake-vans.
Normal rolling-stock of the Indus Valley (State) Railway	25	25	140	20	775	325	5	35
Vehicles required to compose the 40 trains at Lahore (4 horses in a van), with 30 per cent. added for carriages under repair ...	47	519	287	1,005	351	117	12	262
Difference	-22	-494	-147	-985	+424	+208	-7	-227

The normal stock would, therefore, have to be increased by—

22 First class,
641 Second or third class,
561 Covered wagons or horse trucks,
7 Powder-vans,
227 Brake-vans,

or a total of 1,458 vehicles.

37. *Fourth condition.*—Para. 30 explains that the last train, under this condition, takes the place of No. 29 train in the Time-table (Appendix D), and, leaving Lahore at 7 P. M. on the 7th September, reaches Kurrachee at 2 P. M. on the 10th; time of movement 19½ hours, or 8 days and 2 hours.

38. The whole of the 57 trains would have to be in readiness at Lahore, requiring the normal rolling stock of the Indus Valley (State) Railway to be increased by—

24 First class,
732 Second or third class,
687 Horse-vans or covered wagons,
12 Powder-vans,
248 Brakes,

or total of 2,223 vehicles, allowing 30 per cent. for those under repair

39. To recapitulate;—

1st. The broad gauge would require 43 trains of 40 vehicles each, or 1,716 vehicles in all, to convey the proposed force from Lahore; while the total time occupied in the movement would be—

(a) to Rawulpindee 4 days, 5 hours,

(b) to Kurrachee, 5 days, 22 hours,

the rate of travelling being $15\frac{1}{2}$ miles an hour, including stoppages, and 12 trains being despatched daily.

2nd.—The narrow gauge would require, under the first two conditions, 74 double trains of 50 vehicles each, or 3,693 vehicles in all, to transport the force; and, under the last two conditions, $56\frac{1}{2}$ double trains of 50 vehicles each, or 2,825 vehicles.

The number of vehicles required, in addition to the normal rolling-stock of each line, and the time occupied in the movement under the several conditions, would be—

	TIME.		Number of vehicles required in addition to normal rolling-stock.
	Days.	Hours.	
<i>First condition.</i>			
Ordinary stock, and four hours' intervals	{ to Rawulpindee ...	13 9	320
	{ to Kurrachee ...	15 14	1,505
<i>Second condition.</i>			
Ordinary stock, and two hours' intervals	{ to Rawulpindee ...	7 7	842
	{ to Kurrachee ...	9 12	4,231
<i>Third condition.</i>			
Special horse-vans, and four hours' intervals.	{ to Rawulpindee ...	10 13	318
	{ to Kurrachee ...	12 18	1,458
<i>Fourth condition.</i>			
Special horse-vans, and two hours' intervals.	{ to Rawulpindee ...	5 21	842
	{ to Kurrachee ...	8 2	2,223

The rate of travelling being uniform, namely, 12 miles an hour, including stoppages.

40. It will now be necessary to select one of the above four conditions, in order that a fair comparison may be instituted between the capabilities of the broad and narrow gauge railways for the purpose of military transport.

41. With regard to the broad gauge line, there can be no doubt that the service could be performed in the time and at the speed given in paras. 9 and 10; for the required amount of rolling-stock already exists, and the rate of travelling maintained by the ordinary passenger and mail trains on the Delhi and Punjab Railways is 16 and 18 miles, respectively, inclusive of stoppages.

42. Indeed, supposing the railway staff to be of adequate strength, and the platform accommodation at the arrival terminus to be sufficient to admit of 5 or 6 trains being unloaded at the same time, it might be possible, on an emergency, to start a broad gauge train every $1\frac{1}{2}$ hours, or even every hour, on the Lahore-Rawalpindee Section.

43. The distance between the stations on this section in no instance exceeds $13\frac{1}{4}$ miles, so a speed of $15\frac{1}{2}$ miles an hour would permit "line clear" messages being received in sufficient time to despatch trains at intervals of 1 or $1\frac{1}{2}$ hours, thus reducing the time of the supposed movement between Lahore and Rawalpindee to 59 and 80 hours.

44. On the Lahore-Kurrachee Section, 2 hours is the shortest interval at which trains could follow each other, for the distance between some of the stations is 22 miles, which would cause a delay of $1\frac{1}{2}$ hours before the necessary "line clear" messages could be received.

45. But, for the reasons given in paras. 11, 12 and 20 of the Memorandum by the Deputy Quarter Master General, dated 5th October 1872, it is very doubtful whether trains on single lines could ever be despatched with less than 2 hours' intervals, and then only when it is not necessary to run return trains of "empties;" for, if an insufficiency of rolling-stock renders this unavoidable, it may be safely asserted that no Traffic Manager, with a limited staff consisting principally of natives, would undertake to run trains on a single line of rails with a less interval than 4 hours. The broad gauge can command a sufficiency of rolling-stock, but the more limited narrow gauge cannot do so.

46. If the above reasoning be sound, it follows that the "third condition," viz., specially constructed horse-vans, and 4 hours' intervals, would be the most correct one to compare with the broad gauge railway in respect of capacity for military transport; for Mr. Molesworth appears satisfied that trucks capable of carrying four horses can be constructed for the narrow gauge railways, and that they will be able to take their share of the ordinary traffic of the line, as well as the smaller sized trucks.

47. Before, however, any satisfactory comparison can be made as to the relative capabilities of the two systems of railways for transporting troops, it is desirable to ascertain the time in which the given force would march from Lahore to Rawalpindee.

48. As the troops would, in all probability, march in detachments to facilitate the provisions of supplies and transport, it will be convenient to divide them into four divisions, including in each all those arriving at Lahore by 12 P. M. the previous day.

9. The movement would then be made as follows :—

1st Division.

No. 1 Battery of Field Artillery	...	{ Troops which have arrived at Lahore by 12 P. M. on 2nd September, to march at noon on the 3rd, and reach Rawulpindee by noon on the 13th September.
" 2 " of " "	...	
" 1 " of Royal Horse Artillery	...	
" 1 Regiment of British Infantry	...	

2nd Division.

No. 2 Regiment of British Infantry	...	{ Troops which have arrived at Lahore by 12 P. M. on the 3rd September, to march on the 4th, and reach Rawulpindee on the 14th September.
" 1 " of Native Cavalry	...	
" 1 " of " Infantry	...	
" 2 " of " "	...	
" 3 " of " "	...	

3rd Division.

No. 2 Battery of Royal Horse Artillery,		{ Troops which have arrived at Lahore by 12 P. M. on the 4th September, to march on the 5th, and reach Rawulpindee on the 15th September.
" 1 Regiment of British Cavalry	...	
" 2 " of Native "	...	
" 3 " of " "	...	
" 4 " of " Infantry	...	
" 5 " of " "	...	
" 6 " of " "	...	

4th Division.

No. 3 Battery of Field Artillery	...	{ Troops which have arrived at Lahore by 12 P. M. on the 5th September, to march on the 6th, and reach Rawulpindee by noon on the 16th September.
" 3 Regiment of British Infantry	...	
" 4 " of Native Cavalry	...	
" 7 " of " Infantry	...	
3 Companies of Sappers and Miners,		

50. Each division* would thus accomplish the movement in 252 hours, or $10\frac{1}{2}$ days, being an average of 15·5 miles† a day, the last division reaching Rawulpindee at 12 noon on the 16th September, or 14 days after the arrival of the first detachment at Lahore, and only 83 hours after the last troop train, travelling under the "*third condition*" gets to Rawulpindee, so that very little would be gained by using the narrow gauge railway under the proposed arrangements; indeed, it would be more convenient to send the troops by road, especially during the cold weather months, when they would gain by the exercise, and the danger of sickness breaking out from having so large a number of men and animals collected in the neighbourhood of a railway station for ten

* The Mountain Battery is not included as that does not arrive at Lahore until 12 P. M. on the 7th September, but, if necessary, it could reach Rawulpindee on the 16th September by forced marches.

† Lahore to Rawulpindee is only 171 miles, with a good road all the way; an average march of 15½ miles a day cannot, therefore, be considered excessive for so short a distance.

days would be avoided; besides which, the resources of the railway, instead of being entirely devoted for upwards of 11 days (it would be 11 days and 12 hours before the last train returned to Lahore) to the concentration of troops, could be utilized for the transport of material, commissariat stores, &c.

51. From the above data the following rule may be deduced, by the application of which it can be seen at once whether it is more expeditious to move a given number of troops by the railway or the road:—

1st.—When troops march at the rate of 15.5 miles a day, it will only be advantageous in point of time to use the narrow gauge railway (the “*third condition*” is here referred to), when the number of miles is 16* times the number of thousands of troops.

2nd.—If troops march at the rate of 12 miles a day only, which is probably as much as they would do for a long distance in the hot weather, the number of miles must be 12.6 times the number of thousands.

3rd.—With the broad gauge the case is very different; it will be advantageous to rail troops when the number of miles is 6.4 and 4.8 times the number of thousands, according as the rate of marching is 15.5 or 12 miles a day.

52. From which it appears that, even supposing vans capable of conveying four horses be specially constructed, and the carrying capacity of the Punjab Northern (State) Railway be increased to the extent laid down in para. 28, a force of 10,000 men would march a distance of 160 miles from Lahore, or nearly as far as Rawalpindie, as quickly as it could be conveyed by a narrow gauge railway.

53. It will probably be urged, that if the vehicles of the Indus Valley Railway were concentrated upon the Punjab Northern Railway, they would much more than suffice for 6 trains per diem each way; and that, if a third rail were laid between Delhi and Lahore, so as to connect the Rajpootana (State) Railways with the State Lines in the Punjab, the deficiency of rolling-stock, now apparent, could be partially supplied.

54. With regard to the first point, it may be said, that if circumstances required the concentration of a military force on the North-West Frontier, it would probably be necessary simultaneously to hurry up reinforcements from the sea-coast towards Mooltan and Lahore, and it would not, therefore, be prudent to regard the rolling-stock of the Indus

* By rail 171 miles is accomplished in 232 hours.
 By marching 160 ditto 252 “
 therefore, when troops can march 15½ miles a day, nothing will be gained in time in conveying a force of 10,000 men by a narrow gauge railway, unless the distance is more than 160 miles, or more than 16 times the number of thousands of troops.

Valley Railway as available to supply the deficiencies of the Punjab Northern Railway, or *vice versa*.

55. And with reference to the second point, it seems very doubtful whether the transport of the force would be materially accelerated by the addition of the narrow gauge vehicles of the Rajpootana (State) Railways, for—

- (a). These vehicles could not travel to Lahore until the broad gauge line was clear of troop trains, therefore the first train could not reach Lahore until 4 P. M. on the 5th September, even supposing it travelled at the rate of $15\frac{1}{2}$ miles an hour; and—
- (b). It is not certain that, even the possession of this extra rolling-stock would enable a greater number of trains to be despatched in the 24 hours, for this element in the calculations is governed by the adequacy of the engine power to transport the additional trains. Moreover, if the distance the troops had to be conveyed was not further than Rawulpindee or Attock, the trains which started with the first detachments would have returned to Lahore before the Rajpootana vehicles could arrive there, and there would be no necessity to use them.

56. Hitherto our calculations have been confined to the relative capabilities of the broad and narrow gauge railways for transporting troops, &c., it is now necessary to enquire what effect a break of gauge would have on the movement of such a force as that under consideration.

57. By referring to Appendix C, and to the statement given at para. 22 of the Memorandum dated 5th October 1872, we find, that by the time No. 1 narrow gauge train was loaded and ready to start (3 A. M. on 3rd September), ten broad gauge trains would have reached Lahore, *viz.* :—

	Trains.
From Jullundur and Umballa	7
From Mooltan	3

and the following troops would be at the station waiting for rail transport :—

- 1 Battery of Royal Horse Artillery.
- 2 Batteries of Field Artillery.
- 1 Regiment of British Infantry, and a small detachment of a second regiment.
- 1 „ of Native „ and
- $\frac{1}{2}$ „ (nearly) of Native Cavalry.

58. A detachment of the 1st British Infantry Regiment would be about to start (No. 1 train), and a Battery of Field Artillery would be loading Nos. 2 and 3 trains, while a second detachment of British Infantry would be loading No. 4 train (Appendix D), the whole requiring about 4,000 feet of platform* accommodation in the narrow gauge terminus. A similar length would be necessary at the terminus of the broad gauge; for before any train conveying Artillery or Cavalry could unload and get clear of the station, two other trains would have arrived, and a third would be so close that, to prevent delay and accidents, it would be imperative to have a sufficient length of platform to admit of four trains being drawn up at the same time.

59. The pressure at the railway station would increase every two hours, and at 2 P. M. on the 5th September, when the whole force would have reached Lahore, except the Mountain Battery from Jutog, the climax would be reached and the Officer superintending the transport would have to dispose of the following troops until trains could be got ready for their reception, viz. :—

- 2 Batteries of Royal Horse Artillery.
- 1 Battery of Field Artillery.
- 1 Regiment of British Cavalry.
- 2 Regiment of „ Infantry.
- 3 „ of Native Cavalry.
- 7 „ of „ Infantry.
- 3 Companies of Sappers and Miners.

60. Supposing that it were necessary for a large number of troops, arriving in succession at short intervals, to change from the terminus of one line to the terminus of another, even without a break of gauge, and to find there, trains made up of a similar number and description of vehicles as those they had quitted, and that these trains were despatched at precisely the same intervals as the former trains had arrived, it would require very perfect arrangements, and almost unlimited platform accommodation, to carry out the unloading of one set of vehicles, and the reloading of the other with order and regularity.

61. But if added to this, there were a break of gauge and every train detachment and even every carriage detachment, had to be broken up and reformed, to suit the different capacities of the new carriages, and if all the equipment, ammunition and baggage had to be re-distributed in different allotments, it would be impossible adequately to present the delay and confusion which might take place at night or in the extreme heat of the day, or in bad weather, when it would be detrimental to expose the troops. And further, as a narrow gauge train

* In estimating this length, I have been guided by the dimensions laid down in letter No. 328 R, dated Allahabad, 30th November 1869, from the Secretary to Government, North Western Provinces, in the Public Works Department, to the Officiating Joint Secretary of Bengal, Public Works Department, Railway Branch.

could not carry away the whole number of troops with their baggage and equipment that would arrive in a broad gauge train, there must be an accumulation at the station, even supposing the intervals of arrival and departure were the same; but the normal rolling-stock of the two gauges almost conclusively determine that the intervals of departure of the narrow must be considerably greater than those of the broad gauge.

62. It is not difficult then to picture the condition the station would be in after the first few hours; men, horses, guns, and baggage, would be so crowded together that it would be necessary either to stop any more trains coming in, and thus check the communication along several hundred miles of railway, or to march the troops away, and encamp them on the nearest available ground. In fact, it is scarcely possible to conceive the confusion that would exist; any attempt at re-organization within the widest limits of a railway station would be hopeless, and this could only be effected in the several camps. In addition, therefore, to the very serious delay which the break of gauge would occasion, a considerable expense would have to be incurred for carrying the baggage, &c., to and fro between the camps and railway station.

63. It may be said that the scene here described would be avoided were the troops not brought up to Lahore until narrow gauge trains were ready for their reception. But this argument supposes an abandonment of the means of concentration we already possess in the broad gauge lines, and practically reduces both descriptions of railway to the same level. We are now engaged in drawing a comparison between the gauges, and to do this we must show the maximum of work of which each is capable. If we make the broad gauge wait upon the narrow, the comparison, and the results evolved, would be false, and, therefore, worthless.

64. It is also to be noted, that the quicker the broad gauge trains can land the troops at Lahore, the sooner will the vehicles become available for the transport of stores and munitions of war. The delay that a break of gauge causes in the movement of troops is quite sufficient to condemn it, without also making it the means of retarding the collection of the supplies, ordnance stores, &c., which would be so urgently required.

65. If it be argued that the conditions of national defence in India differ entirely from those which exist in Europe; that no pressing necessity for the concentration of troops could arise without such previous warning as would afford time for deliberate preparations; and that, therefore, it matters little whether 10,000 men can be conveyed from Lahore to Rawalpindie in a week or a fortnight; it may be replied, that notwithstanding our military power and efficiency, reverses are not impossible, and might involve even greater and more sudden demands on our resources of transport than those which we have had under consideration.

66. The Consulting Engineer to Government for State Railways having perused the foregoing paras. has drawn up, from independent data, and under conditions somewhat different from those on which the preceding calculations have been based, the following table. It will be seen that the results exhibited agree so closely with those arrived at in this Memorandum, that it may be assumed Mr. Molesworth would not dispute their general accuracy :—

		Time, including 11 hours' delay at Lahore.	Number of vehicles.	Number of vehicles available.	Number available for any other service.	Deficiency.
		Days.				
"Third condition." trains at four hours' intervals, and four horses in a van.	a.—Lahore to Rawulpindee ...	10·67	550	2,260	1,710	
	b.—Mooltan to Kurrachee ...	9·75	1,080	2,260	1,360	
	c.—Mooltan or Kotree to Sukkur ...	9	900	2,260	1,360	
	a and c simultaneously ...	...	1,450	2,260	810	
"Fourth condition." trains at two hours' intervals, and four horses in a van.	a.—Lahore to Rawulpindee ...	5·83	1,100	2,260	1,160	
	b.—Mooltan to Kurrachee ...	5·92	2,160	2,260	100	
	c.—Mooltan to Sukkur ...	5·20	1,800	2,260	460	
	a and c simultaneously ...	...	2,960	2,260	...	700

67. The time required for each movement is practically the same in both calculations, while the difference in the number of vehicles available is due to the Consulting Engineer to Government making use of the normal rolling-stock of both narrow gauge railways to meet the requirements of either, and in addition, reckoning on a reserve of 1,000 vehicles, constructed specially for military purposes, and available for either the Lahore-Rawulpindee, or Lahore-Kurrachee Sections.

68. The Consulting Engineer to Government at page 4 of his printed Memorandum dated 23rd April 1873, does "not think it would be prudent to reckon on the rolling-stock of the Indus Valley (State) Railway for concentration on the Punjab Northern (State) Railway," and states "that the quantity of vehicles on each must be determined by the number of trains per day required in any military emergency."

69. This opinion agrees with what has been stated in para. 54 of this Memorandum, and is a safer one to adopt than that urged by Mr. Molesworth a little further on, when discussing the increase necessary to

the two railways ; he says, "as however it is not likely that the *full* number of trains for an emergency would be required on both lines at once, the total increase to the rolling-stock of both lines would probably not be required."

70. With regard to the "military reserve," it is submitted, that it is assuming a very great advantage to calculate on vehicles which would not be required for the ordinary traffic of the line, and the existence of which would be constantly threatened by the paramount interests of economy.

71. Before concluding this Memorandum, it seems advisable to consider the capabilities of the narrow gauge vehicles for the transport of Artillery.

72. According to the Consulting Engineer to Government for State Railways, the inside measurements of the open low-sided wagons are 14 by 6, or 84 square feet : to carry either Field or Siege artillery on trucks of these dimensions, the guns and wagons must be unlimbered, and to put the limbers in the same trucks with their guns or wagons, they must be reversed, with the shafts resting on their guns or wagon bodies, while the muzzles of the guns, and the naves and axle-tree arms of carriages must project over the ends and sides of the railway trucks—to admit of this, the sides of the trucks should not be higher than one foot nine inches for Field, and one foot six inches for Siege artillery.

73. From the above it will be seen, that while the narrow gauge vehicles will be able to convey any artillery likely to require rail transport in this country, the space for men to work is so confined as to render the loading and unloading of Field artillery a much more tedious operation than with the larger trucks of the broad gauge ; if, therefore, five to six hours be found necessary for loading a battery of Horse or Field artillery on broad gauge vehicles, six to seven hours, at the very least, would be required for the same work on the narrow gauge ; and with the heavier guns and carriages of Siege artillery the operation would be even more lengthy and difficult.

74. Possibly a little time and labour might be saved by placing the gun-carriages and limbers on separate trucks, but the advantage would be in some degree counterbalanced by the extra number of trucks required.

QUARTER MASTER GENERAL'S OFFICE

HEAD QUARTERS: SIMLA.

The 13th June 1873.

FRED ROBERTS, *Lieut Col.*

Offg. Quarter Master General.

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Offg. Quarter Master General.

APPENDIX A.

APPROXIMATE CALCULATION OF THE NUMBER OF VEHICLES REQUIRED
FOR THE CONVEYANCE OF THE SEVERAL ARMS OF THE SERVICE BY THE
NARROW GAUGE RAILWAY.

1st—If the ordinary stock be used, and only two horses go in a van.

BATTERY OF ROYAL HORSE ARTILLERY.

STRENGTH :

6 Officers.					
2 Staff Sergeants.					
155 Non-Commissioned Officers and men.					
2 Medical Subordinates					
with					
334 Maunds 20 seers of baggage, and					
276 Maunds 32 seers of camp equipage,					
6 Officers	...	...	...	...	1 First class.
2 Staff Sergeants	...	...	...	...	} 9 Second "
2 Medical Subordinates	...	...	...	...
155 Non-Commissioned Officers and men	...	...	...	...
253 Followers	...	...	...	...	9 Third "
193 Horses	...	...	...	...	97 Horse-vans.
89 Ponies	...	...	...	...	} 17 Cattle "
20 Bullocks	...	...	...	...
Guns, wagons, and store-carts	...	...	...	...	18 Open wagons
Harness and Battery stores...	...	...	...	...	3 Covered "
61 Doolies	...	...	...	...	2 " "
Baggage and 37 maunds of Camp equipage	...	...	...	...	18 Brakes.
Camp equipage	...	...	...	...	4 Covered wagons.
Total	...	...	...	...	178 vehicles.

BATTERY OF FIELD ARTILLERY.

STRENGTH :

6 Officers.
2 Staff Sergeants.
155 Non-Commissioned Officers and men.
2 Medical Subordinates
with
331 Maunds of baggage, and
277 Maunds of Camp equipage.

BATTERY OF FIELD ARTILLERY—(concluded).

6 Officers	...	...	...	1	First class.
2 Staff Sergeants	..	...	...	9	Second „
2 Medical Subordinates	...	...	...
155 Non-Commissioned Officers and men	...	...	...
246 Followers	...	...	...	9	Third „
118 Horses	...	...	...	59	Horse-vans.
55 Ponies	...	...	...	14	Cattle „
27 Bullocks	...	...	...
Guns, wagons, and store-carts	...	...	...	18	Open wagons.
Harness and battery stores...	...	...	...	3	Covered „
Doolies	...	...	...
Camp Equipage	...	...	...	4	„ wagon.
Baggage and 37 maunds camp-equipage.	...	...	...	1	„ wagon.
				14	Brakes.
Total				132	vehicles.

NOTE.—As the brakes are too small to take the camp equipage of British troops, only baggage has been placed in them.

BATTERY OF MOUNTAIN ARTILLERY.**STRENGTH :**

- 6 Officers.
- 2 Staff Sergeants.
- 92 Non-Commissioned Officers and men.
- *119 Native Drivers.
- 2 Medical Subordinates
- with
- 240 Maunds of Baggage, and
- 63 Maunds 35 seers of Camp equipage.

6 Officers	...	...	...	1	First class.
2 Staff Sergeants	...	...	...	6	Second class.
2 Medical Subordinates	...	...	...
92 Non-Commissioned Officers and men	...	...	...
200 Followers	...	...	...	7	Third class.
12 Horses	...	...	...	6	Horse-vans.
178 Mules	...	...	...	30	Cattle vans
3 Bullocks	...	...	...
Guns, carriages, ammunition boxes &c.	...	...	...	2	Powder-vans.
Harness and battery stores	...	...	...	3	Covered wagons
Camp equipage	...	...	...	1	„ wagon.

* Travel with mules.

BATTERY OF MOUNTAIN ARTILLERY—(concluded).

Baggage and 3 maunds and 35 seers	7	Brakes.
of Camp equipage	2	Covered wagons
12 Doolies	1	„ wagons.
Total ...	66	vehicles.

REGIMENT OF BRITISH CAVALRY.**STRENGTH :**

25 Officers.		
11 Staff Sergeants.		
444 Non-Commissioned Officers and men.		
4 Medical Subordinates		
with		
1,025 Maunds of baggage, and		
792 Maunds 3 seers of Camp equipage.		
25 Officers	5	First class.
11 Staff Sergeants		
4 Medical Subordinates	26	Second class.
444 Non-Commissioned Officers and men		
716 Followers	24	Third class.
503 Horses	252	Horse-vans.
218 Ponies		
12 Bullocks	39	Cattle-vans.
Harness and regimental stores ...	3	Covered wagons
Ammunition	1	Powder-van.
45 Doolies	4	Covered wagons.
Camp equipage	13	„ „
Baggage and 12 maunds of Camp	41	Brakes.
equipage	2	Covered wagons
Total ...	410	vehicles.

REGIMENT OF BRITISH INFANTRY.**STRENGTH :**

30 Officers.
9 Staff Sergeants.
876 Non-Commissioned Officers and men.
4 Medical Subordinates
with
1,654 Maunds of baggage, and
1,197 Maunds of Camp equipage.

REGIMENT OF BRITISH INFANTRY—(*concluded*).

30 Officers	...	...	...	...	5 First class.
9 Staff Sergeants	...	...	...	...	50 Second class (7 seats occupied by followers).
4 Medical Subordinates	...	...	...	...
876 Non-Commissioned Officers and men,	...	...	...	...
1,057 Followers	...	...	...	...	35 Third class (7 in a second class carriage).
7 Horses	...	...	...	...	4 Horse-vans.
16 Bullocks	...	...	...	...	3 Cattle "
90 Doolies	...	...	...	...	6 Covered wagons.
Ammunition	...	...	...	...	1 Powder-van.
Camp equipage and 3 maunds of baggage	...	...	...	...	20 Covered wagons
Baggage	...	...	...	...	21 " "
					17 Brakes. "
Total					162 vehicles.

REGIMENT OF NATIVE CAVALRY.

STRENGTH :

8 Officers.					
13 Native Officers.					
444 Non-Commissioned Officers and men.					
2 Medical Subordinates					
with					
330 Maunds of baggage, and					
304 Maunds of camp equipage.					
8 Officers	...	...	...	...	2 First class.
13 Native Officers	...	...	...	...	*25 Second "
2 Medical Subordinates	...	...	...	...
444 Non-Commissioned Officers and men	...	...	...	...
196 Followers	...	...	...	...	7 Third "
464 Horses	...	...	...	...	242 Horse-vans.
235 Ponies	...	...	...	...	40 Cattle "
Harness and regimental stores and six doolies	...	...	...	...	8 Brakes.
Ammunition	...	...	...	...	1 Powder-van.
Camp equipage and baggage	...	...	...	...	28 Brakes.
Total					353 vehicles.

* Four Native Officers go into the first class, and five men into the third class.

BATTERY OF MOUNTAIN ARTILLERY—(concluded).

Baggage and 3 maunds and 35 seers	7	Brakes.
of Camp equipage	2	Covered wagons
12 Doolies	1	„ wagons.
<hr/>		
Total ...	66	vehicles.

REGIMENT OF BRITISH CAVALRY.**STRENGTH :**

25 Officers.		
11 Staff Sergeants.		
444 Non-Commissioned Officers and men.		
4 Medical Subordinates		
with		
1,025 Maunds of baggage, and		
792 Maunds 3 seers of Camp equipage.		
25 Officers	5	First class.
11 Staff Sergeants	26	Second class.
4 Medical Subordinates		
444 Non-Commissioned Officers and men		
716 Followers	24	Third class.
503 Horses	252	Horse-vans.
218 Ponies	39	Cattle-vans.
12 Bullocks		
Harness and regimental stores ...		
Ammunition	3	Covered wagons
45 Doolies	1	Powder-van.
Camp equipage	4	Covered wagons.
Baggage and 12 maunds of Camp	13	„ „
equipage	41	Brakes.
	2	Covered wagons
<hr/>		
Total ...	410	vehicles.

REGIMENT OF BRITISH INFANTRY.**STRENGTH :**

30 Officers.
9 Staff Sergeants.
876 Non-Commissioned Officers and men.
4 Medical Subordinates
with
1,654 Maunds of baggage, and
1,197 Maunds of Camp equipage.

THREE COMPANIES OF SAPPERS & MINERS—(*concluded*).

153 Followers	...	...	...	5	Third class (3 followers in 2nd class)
Equipment and doolies	...	...	...	7	Covered wagons.
Baggage	...	...	...	4	Brakes.
Camp equipage	...	...	...	5	Covered wagons.
Total				—	42 vehicles.
				—	

REGIMENT OF NATIVE INFANTRY.

STRENGTH:

8 Officers.					
16 Native Officers.					
696 Non-Commissioned Officers and men.					
2 Medical Subordinates					
with					
474 Maunds of baggage, and					
307 Maunds of Camp equipage.					
8 Officers	...	...	...	...	2 First class (4 spare seats).
16 Native Officers	...	...	...	...	} *39 Second "
696 Non-Commissioned Officers and men	...	...	...	...
2 Medical Subordinates	...	...	...	...
272 Followers	...	...	...	...	10 Third class.
8 Horses	...	...	...	...	4 Horse-vans.
8 Doolies	...	...	...	...	1 Covered wagon.
Ammunition	...	...	...	...	1 Powder-van.
Camp equipage	...	...	...	...	7 Brakes.
Baggage and 161 maunds of Camp equipage	...	...	...	...	11 Covered wagons
Total ...					75 vehicles.

THREE COMPANIES OF SAPPERS AND MINERS.

STRENGTH.

3 Officers.					
6 British Non-Commissioned Officers.					
6 Native Officers.					
336 Non-Commissioned Officers and men.					
1 Medical Subordinate					
with					
234 Maunds of baggage,					
134 " of Camp equipage, and					
303 " 30 seers of equipment.					
3 Officers	...	...	...	...	1 First class.
6 British Non-Commissioned Officers	...	...	...	...	} 20 Second "
6 Native Officers	...	...	...	...
336 Non-Commissioned Officers and men	...	...	...	...
1 Medical Subordinate	...	...	...	...

* Four Native Officers go into the first class, and eight men into the third class.

THREE COMPANIES OF SAPPERS & MINERS—(*concluded*).

153 Followers	...	...	...	...	5	Third class (3 fol- lowers in 2nd class)
Equipment and doolies	...	...	...	...	7	Covered wagons.
Baggage	...	...	...	...	4	Brakes.
Camp equipage	...	...	...	...	5	Covered wagons.
Total					—	42 vehicles.
					—	

2ndly.—If special trucks be constructed for carrying four instead of two horses

	First class.	Second class.	Third class.	Horse-vans and cattle-trucks.	Covered wagons.	Open wagons.	Powder-vans.	Brakes.	TOTAL.
Battery of Horse Artillery ...	1	9	9	66	11	18	...	13	127
" of Field " ...	1	9	9	44	9	18	...	11	101
" of Mountain " ...	1	6	7	33	7	...	2	7	63
Regiment of British Cavalry ...	5	26	24	165	27	...	1	28	276
" of " Infantry ...	5	50	36	5	48	...	1	16	160
" of Native Cavalry ...	2	25	7	161	6	...	1	22	224
" of " Infantry ...	2	39	10	2	12	...	1	7	73
Three Companies of Sappers and Miners ...	1	20	...	...	...	...	...	...	...

(80)

Table 2.—(concluded).

Number of Train.	NUMBER OF		REMARKS.
	For each train.		
1	40	...	
2 {	22	...	
3	18	...	
4 {	40	...	
5	39	...	
6 {	1	...	
7	40	...	
8	21	...	
9	19	...	
10	40	...	
11	40	...	
12	30	...	

2ndly.—If special trucks be constructed for carrying four instead of two horses

	First class.	Second class.	Third class.	Horse-vans and cattle-trucks.	Covered wagons.	Open wagons.	Powder-vans.	Brakes.	TOTAL.
Battery of Horse Artillery ...	1	9	9	66	11	18	...	13	127
" of Field " ...	1	9	9	44	9	18	...	11	101
" of Mountain " ...	1	6	7	33	7	...	2	7	63
Regiment of British Cavalry ...	5	26	24	165	27	...	1	28	276
" of " Infantry ...	5	50	36	5	48	...	1	16	160
" of Native Cavalry ...	2	25	7	161	6	...	1	22	224
" of " Infantry ...	2	39	10	2	12	...	1	7	73
Three Companies of Sappers and Miners ...	1	20	5	...	19	...	...	...	...

(80)

Table 2. (concluded).

Number of Train.	NUMBER OF		REMARKS.
	For each train.		
1	40	...	
2 {	22	...	
3 {	18	...	
4 {	40	...	
5 {	39	...	
6 {	1	...	
7 {	40	...	
8 {	21	...	
	19	...	
	40	...	
	40	...	
	56	...	

VI.

THE following General Order, containing an account of a very gallant affair which took place upwards of fifty years ago, is published as likely to be interesting to the readers of the Journal :—

(COPY.)

G. O. by the Commander-in-Chief, Madras, dated 21st January 1818.

Head Quarters of the Army of the Deccan Camp at Mahidpoor, Wednesday, 21st January 1818, G. O. by the Commander-in-Chief.

It is with feelings of inexpressible gratification, that the Commander-in-Chief has to announce one of the most heroic and brilliant achievements ever recorded in the annals of the Army, which took place at the village of Corygaum, between Seroor and Poonah, on the 1st instant.

The official details of this glorious affair reached the Commander-in-Chief yesterday, in a Despatch from Brigadier General Lionel Smith, C. B., Commanding the 2nd or Poonah Division of the Army of the Deccan, and His Excellency is pleased to publish the Brigadier General's orders, issued on the occasion, that the Army may be placed in full possession of every particular of an event displaying so bright and distinguished an example of devoted courage and admirable constancy :—

CAMP NEAR SEROOR,

Wednesday, 7th January 1818.

D. O. BY BRIGADIER-GENERAL SMITH.

The Commanding Officer, having received the official accounts of an attack made by the Peishwah's Army on a small Detachment, commanded by Captain Staunton, of the 2nd Battalion, 1st Regiment, Bombay Native Infantry, at the village of Corygaum, has great satisfaction in publishing the particulars for general information, and in holding it up to the Force, as one of the most brilliant examples of gallantry and perseverance recorded in our Indian Annals.

The Detachment, consisting of a Detail of Madras Artillery, and 2 six-pounders, the 2nd Battalion 1st Regiment about 600 strong, and about 300 Auxiliary Horse, the whole under Captain Staunton, marched from Seroor for Poonah at 8 P. M. on the 31st December, and reached the heights overlooking Corygaum about 10 o'clock on the forenoon of the 1st January, from whence the whole of the Peishwah's Army, estimated at 20,000 horse and several thousand infantry, were discovered on the plain south of the Beemah River.

Captain Staunton immediately moved upon the village of Corygaum, with the intention of occupying it, and had scarcely succeeded in reaching it with his Detachment, when he was attacked in the most determined manner by three divisions of the Peishwah's choicest Infantry, supported by immense bodies of horse and the fire of two pieces of Artillery.

The enemy's troops were stimulated to their utmost exertions, by the presence of the Peshwa on a distant height, attended by the principal Maharatta Chiefs, who flattered His Highness with the prospect of witnessing the destruction of this gallant handful of British Troops.

The enemy obtained immediate possession of the strongest parts of the village, from which it was found impossible to dislodge them, and the possession of the remaining part was most obstinately contested from noon till 9 P. M., during which time almost every pagoda and house had been repeatedly taken and re-taken, and one of the guns at one time was in possession of the enemy.

Towards the close of the evening, the detachment was placed in a most trying situation : at this period, nearly the whole of the Artillery men were killed or wounded, and about one third-of the Infantry and Auxiliary Horse. The exertions which the European Officers had been called upon to make in leading their men to frequent charges with the bayonet, had diminished their numbers. Lieutenant Chisholm, of the Artillery, and Mr. Assistant Surgeon Wingate, 2nd Battalion, 1st Regiment, were killed ; Lieutenants Swanston, Pattison, and Connelan, were wounded ; leaving only Captain Staunton, Lieutenant Jones, and Mr. Assistant Surgeon Wylie, nearly exhausted, to direct the efforts of the remaining part of the Detachment, who were nearly frantic from the want of water, and the almost unparalleled exertions they had made throughout the day without any sort of refreshment, after a fatiguing march of 28 miles.

Under cover of the night they were enabled to procure a supply of water ; and at 9 P. M. the enemy were forced to abandon the village, after sustaining an immense loss in killed and wounded. The British character was nobly supported, throughout the whole of the arduous contest, by the European officers and small detail of Madras Artillery ; the Medical Officers led on the sepoys to charges with the bayonets, the nature of the contest not admitting of their attending to their professional duties, and in such a struggle, the presence of a single European was of the utmost consequence, and seemed to inspire the native soldiers with their usual confidence of success.

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REGIMENT OF NATIVE INFANTRY.**STRENGTH:**

8 Officers.					
16 Native Officers.					
696 Non-Commissioned Officers and men.					
2 Medical Subordinates					
with					
474 Maunds of baggage, and					
307 Maunds of Camp equipage.					
8 Officers	...	...	...	...	2 First class (4 spare seats).
16 Native Officers	...	...	...	...	} *39 Second "
696 Non-Commissioned Officers and men	...	...	...	...
2 Medical Subordinates	...	...	...	...
272 Followers	...	...	...	...	10 Third class.
8 Horses	...	...	...	...	4 Horse-vans.
8 Doolies	...	...	...	...	1 Covered wagon.
Ammunition	...	...	...	...	1 Powder-van.
Camp equipage	...	...	...	...	7 Brakes.
Baggage and 161 maunds of Camp equipage	...	...	...	...	11 Covered wagons
Total ...					75 vehicles.

THREE COMPANIES OF SAPPERS AND MINERS.**STRENGTH.**

3 Officers.					
6 British Non-Commissioned Officers.					
6 Native Officers.					
336 Non-Commissioned Officers and men.					
1 Medical Subordinate					
with					
234 Maunds of baggage,					
134 " of Camp equipage, and					
303 " 30 seers of equipment.					
3 Officers	...	...	...	...	1 First class.
6 British Non-Commissioned Officers	...	...	...	...	} 20 Second "
6 Native Officers	...	...	...	...
336 Non-Commissioned Officers and men	...	...	...	...
1 Medical Subordinate	...	...	...	...

* Four Native Officers go into the first class, and eight men into the third class.

THREE COMPANIES OF SAPPERS & MINERS—(concluded).

153 Followers	...	...	...	...	5	Third class (3 fol- lowers in 2nd class)
Equipment and doolies	...	...	...	...	7	Covered wagons.
Baggage	...	...	...	...	4	Brakes.
Camp equipage	...	...	...	...	5	Covered wagons.
Total					—	42 vehicles.
					—	

2ndly.—If special trucks be constructed for carrying four instead of two horses

	First class.	Second class.	Third class.	Horse-vans and cattle-trucks.	Covered wagons.	Open wagons.	Powder-vans.	Brakes.	TOTAL.
Battery of Horse Artillery ...	1	9	9	66	11	18	...	13	127
" of Field " ...	1	9	9	44	9	18	...	11	101
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Regiment of British Cavalry ...	5	26	24	165	27	...	1	28	276
" of " Infantry ...	5	50	35	5	48	...	1	16	160
" of Native Cavalry ...	2	25	7	161	6	...	1	22	224
" of " Infantry ...	2	39	10	2	12	...	1	7	73

Three Companies of Sappers and

(80)

Table 2.—(concluded).

Number of Train.	NUMBER OF		REMARKS.
	For each train.		
1	40	...	
2 {	22	...	
3	18	...	
4 {	40	...	
5	39	...	
6 {	1	...	
7	40	...	
8	21	...	
	19	...	
	40	...	
	40	...	
	36	...	

CORRESPONDING MEMBERS.

NAMES.	CORPS.	STATIONS.
Lieut.-Col. W. J. Gray ...	Royal Artillery ...	Allahabad.
Major V. C. Conway-Gordon...	B. M. Hyderabad Contingent...	Aurangabad.
Major G. L. C. Merewether, R.E.	P. W. Department ...	Bombay.
Captain A. Battye ...	2nd Goorkhas ...	Dehra Doon.
Captain G. B. Wolseley ...	B. M. ...	Morar.
Lieut. G. E. Churchill ...	... ..	Dhumsala.
Major W. Ker ...	3rd Buffs ...	Fort William
Lieutenant W. S. Peat ...	Brigade Major ...	Jacobabad.
Captain G. W. B. Collis ...	6th Royal Regiment ...	Sealkote.
Major W. Twentyman ...	Brigade Major Nagpore Force ...	Kamptee.
Captain A. D. Butter ...	Brigade Major Eastern Fron- tier District ...	Shillong.
Major H. C. P. Rice ...	1st Sikhs ...	Kohat.
Major G. F. Graham ...	Station Staff ...	Barrackpore.
Capt. R. G. Loch ...	Mhairwara Battalion ...	Ajmere and Nusseerabad.
Lt.-Col. F. B. Norman ...	Royal Engineers ...	Secundrabad.
Capt. P. C. Story ...	Garrison Instructor ...	Meerut.
Lieut. A. Howlett ...	Sappers and Miners ...	Bangalore.
Capt. F. B. Roberts ...	Royal Artillery ...	Cawnpore.
Capt. A. Kinloch ...	Dy. Asst. Adjt. General for Musketry ...	Rawul Pindia.
Colonel H. S. Obbard ...	41st Native Infantry ...	Lucknow.
Capt. E. Gunter ...	59th Regiment ...	Agra.
Capt. J. P. Fitzgerald Cologan,	Station Staff Officer ...	Moradabad.
Surgeon G. J. H. Evatt, M. D.	Army Medical Staff ...	Jubbulpore.

Corresponding Members leaving stations are requested to ask some other member to take up the duties, merely reporting the same to the Secretary.

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Major W. Twentyman	Brigade Major Nagpore Force	Kamptee.
Captain A. D. Butter	Brigade Major Eastern Frontier District	Shillong.
Major H. C. P. Rice	1st Sikhs	Kohat.
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Capt. R. G. Loch	Mhairwara Battalion	Ajmere and Nusseerabad.
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Captain G. W. B. Collis	6th Royal Regiment	Sealkote.
Major W. Twentyman	Brigade Major	Trichinopoly.
Captain A. D. Butter	Brigade Major Eastern Frontier District	Shillong.
Major H. C. P. Rice	1st Sikhs	Kohat.
Major G. F. Graham	Station Staff	Barrackpore.
Lt.-Col. F. B. Norman	24th Punjab N. I.	Jhansi.
Capt. P. C. Story	Garrison Instructor	Meerut.
Lieut. A. Howlett	Sappers and Miners	Bangalore.
Capt. F. B. Roberts	Royal Artillery	Cawnpore.
Capt. A. Kinloch	Dy. Asst. Adj. General for Musketry	Rawul Pindes.
Colonel H. S. Obbard	41st Native Infantry	Lucknow.
Capt. J. F. Fitzgerald Cologan,	Station Staff Officer	Moradabad.
Capt. A. Crookshank	32nd Pioneers	Umballa.
Surgeon Evatt	Army Medical Dept.	Fyzabad

Corresponding Members leaving stations are requested to ask some other member to take up the duties, merely reporting the same to the Secretary.

NOTICE.

MEMBERS of the Institution who have not already done so, are earnestly requested to pay their arrears of donation and subscription, either to the Corresponding Members at their stations, or direct to the Secretary at Simla.

Some members still owe their donation and three years' subscription.

Officers, who may wish to become members, are requested to be kind enough to forward their donations and subscriptions at the same time as they express a wish to join the Institution, and also to inform the Secretary whether their subscription is intended to be for the current year which ends on the 31st May 1875.

Members can pay their subscription to the Alliance Bank, Simla, if more convenient, and the Bank will grant receipts for any money sent.

The entrance fee is 5 rupees and the annual subscription 5 rupees.

Members on changing their addresses are particularly requested to notify the change to the Secretary, in order that delay in forwarding the Journals may be avoided as much as possible.

The address book is corrected up to date from the Army Lists, but mistakes are occasionally unavoidable unless members themselves promptly notify their change of residence.

Members proceeding to England on leave, who wish the Journal to be forwarded to them while absent from India, should inform the Secretary, and send stamps for the overland postage by Brindisi or Southampton as they desire.

When a member appears in orders for leave to England, his Journal is not despatched unless he asks for it, and while absent from India his subscription is not payable unless the Journal is supplied.

Members on return from furlough can obtain the numbers of the Journal that have been published during their absence, by paying the subscription for that period, and all members on returning to India should inform the Secretary of the fact at once.

H. H. STANSFELD, LIEUT.-COLONEL,

Secretary.

ORIGINAL PAPERS.

I.

ESSAY ON THE FORMATION OF AN INTELLIGENCE DEPARTMENT FOR INDIA.

This Essay gained the Durand Medal for 1874.

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PREFACE.

Chapter I.—The object of an Intelligence Department.

Chapter II.—Extracts from the Military History of India bearing on the utility of information in time of war.

Chapter III.—Instances from Modern Warfare, shewing the necessity for and advantages of Intelligence systems.

Chapter IV.—The existing systems of Intelligence in Russia, Austria and Prussia, with remarks on the system of Napoleon the 1st, extracted from *L'Art de la Guerre*.

Chapter V.—Intelligence during war.

Chapter VI.—The Quarter Master General's Department in India and its relation to an Intelligence Department.

Chapter VII.—Organization of an Intelligence Department for India.

PREFACE.

AN Intelligence Department works by collecting the thoughts and opinions of others ; there seems to be, therefore, no objection, in writing on the subject, to follow the lead thus given, and to give original extracts on points which require illustration. The conditions of the Essay also in a measure necessitate extracted information, besides which, where the opinion of the author has coincided with any expressed in a published work, the latter has been given as bearing a greater authority than his own.

The ancient Romans in their temples erected a two-faced statue, one face of which was supposed to look in the direction of peace and the other of war. To erect an outward and visible sign of an Intelligence Department such as this statue represented, might be a return to heathenish practice, it is hoped, however, that instead of a temple and statue, a suitable office will be found, in which the Intelligence Department will, like the ancient deity, keep a watchful eye on the avenues of peace and war, not only prepared in itself for either contingency, but capable of assisting the leaders of the army when opportunity offers.

CHAPTER I.

THE OBJECT OF AN INTELLIGENCE DEPARTMENT.

MODERN warfare requires such an intimate acquaintance with the resources of our enemies, that as time will not allow of this information being gained in the actual experience of a short campaign, it becomes necessary to obtain the desired information beforehand to be used at the very outset of a war ; and though, to compare the last campaign in Europe with any of the former wars in India, would be a comparison of the infinitely great with the infinitely little, yet the principles involved in each are the same, and, therefore, if an Intelligence department has been found of use in European wars, the necessity for its introduction into India is just as great as elsewhere ; the more so, perhaps, as the want of this branch of the service had been recognised and felt out in India, before it had attracted much attention in Europe.

“ Knowledge is power ” is a trite axiom of philosophers ; but however true it may be in the ordinary sense, yet it becomes very much more so in the operations of war, for the power that springs from knowledge, in the one case, can but affect a small number of individuals or portion of a nation, whereas the power for good or evil in the hands of a leader of an army affects, not only his own troops, but the nation itself. Nothing, therefore, that can conduce to the increase of knowledge, as regards the resources of an enemy, can be carelessly disregarded, even if in themselves the items noted have no very direct military application.

The object of an Intelligence Department, then, is to seek for all the information that may be wanted in case of a war, and this, not only as regards one's possible enemies, but with reference to our own dominions. In fact, till the military resources of our country are fairly known, with its capabilities and means for defence, we may find ourselves somewhat in the position of the French Army at the outset of the last war, who possessed maps and information for their advance into Prussia, but lost their way in their own country.

Military intelligence, like charity, must begin at home ; and there is a wide field for its development in India, especially in a transition period when the old order of things is giving place to new conditions ; when once warlike nations are losing their martial spirit, turning their swords into ploughshares ; when the railways, crossing the length and breadth of the land, will be followed by the development of the resources of the country, which should be carefully noted as regards their capabilities of assisting the army or otherwise. To note

all these and similar points regarding one's own country, would be as much the work of the Intelligence department, as to discover the strength and army systems, the topographical and statistical points, connected with other nations ; the two sets of researches might be carried on at the same time, but a real acquaintance with our lands must not be lost sight of, in the novelty of making the acquaintance of other people and their doings.

The Peninsula of India can be considered in two ways with reference to the object of an Intelligence Department, which is to gain information chiefly about one's enemies. Who are the enemies of India ? the answer is—first ; India, as a part of England, is bound or indeed obliged to make common cause with her, in her relation with the rest of the world ; whatever nation is at war with England would seek to attack India if it were in its power to do so ; consequently, India's enemies include every European and other nation that is able to put a fleet into Indian waters.

In the second place, India may be considered as a separate nation from England, possessing her own individual enemies, with whom she must deal herself ; and these again are of two kinds ; internal enemies and external ones. The internal enemies are more difficult to assign a local name, and habitation to ; they would naturally include dethroned potentates and others, who under the pressure of the British forces have to occupy a secondary position instead of ruling as paramount lords of the soil.

The external enemies are those tribes and Asiatic powers beyond our frontiers, with whom we keep relations, but which are not in any way under our control. It is not the object of this paper to define the degree and importance to be assigned relatively to each external or internal enemy, to point out which are the most dangerous to our safety, or the steps which should be taken as regards each ; it is enough to generalise the question here, and to endeavour hereafter to provide a suitable organization which should meet the demands likely to be made on it.

To publish abroad one's enemies by name, and to detail the steps that should be taken as regards meeting their real and supposed objects, would be a poor policy, and one likely to be defeated at the beginning. In conducting enquiries into the affairs of our neighbours, the utmost secrecy is necessary ; suspicion must be lulled and averted, and there should be a satisfactory reason to be assigned for all acts undertaken in the search for information. The practice which now exists in England, of sending a selected number of accredited officers, to report publicly on what they learn during a short, foreign, tour, and the permanent appointment of a military attaché at foreign courts, both possess a very great amount of merit in preparing records for Intelligence matters, and for noting the points which have to be discovered and which are not willingly communicated, such as the state and outlines of fortified posts

harbour defences, &c. liable to attack ; but where information of such is not readily obtainable by direct means, it must be found out indirectly, which can generally be done.

In India, the Political officers represent the Military Attaché, and when the Political Officer is a soldier, such as Sir Henry Lawrence or Major James were in their day, no Military Attaché could have provided better or more useful information ; but where the civil work predominated, or was allowed to predominate from any cause, the benefit to the Army naturally fell off. Though only two names are given, so well known as to require no further eulogy, it is not meant that there were no others who did not come up to the same standard. Indian history is full of the names of men who have distinguished themselves in this way. The military tours of officers have not yet been introduced, but there are so many native armies in India, whose leaders owe only a nominal attachment to the British rule, that we might with some benefit to ourselves, inquire a little more closely into their ways and means ; and a periodical tour of selected officers in each part of India would materially assist in acquiring this information, which, as a rule, it is no one's duty to do now.

In considering the basis on which to form an Intelligence department, we must endeavour to make it as broad and extensive as possible, in order to obtain broad and enlightened views with which to work. It is not by having political officers here and travelling officers there, that we can expect to form a department that will be of use to the Army in time of war ; these men are only the agents of the power which should direct them, and this power, to be worthy of its name of Intelligence, must be directed by men whose life has been a course of study with reference to the objects they keep in view.

The case of the reports on the Prussian army system made by Colonel Baron von Stoffel, French Military Attaché to Prussia during the years preceding the last Franco-German War, is in point. An able officer in the performance of the duties of his post addressed to the War Minister in France valuable and careful statements regarding the military resources of Prussia, which, if they had been made use of, would have enlightened him, and the French Army, as to the position occupied by the Prussian Army. The War Minister, not having time or, perhaps, the wish to read these reports, put them aside, and there being no one else whose business it was to study them, all the valuable information which might have led to very different results for France, was carefully pigeon-holed, to be brought to light only when too late to be of use. If anything could show the necessity of a competent head for the Intelligence department, this case does.

It has been proposed lately, and the idea probably will be carried into execution, that all officers who have passed through the Staff College, on leaving, should be attached to the present Intelligence department at the Horse Guards for three months. If it is expected that the

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Though the opportunity will only now be given to passed Staff
College Officers, to aid in the intelligence work of the Army, yet some
means must be devised to secure as well the information which can be
found among those officers, who have never had a chance of going through
this course, and in India there are officers in every grade, who are un-
able to write the small p. s. c. after their names, and yet who are capable
and willing to work, who could thus be employed. Besides the Officers
of the Army, who may naturally be expected to take an interest in the
promotion of knowledge for the use of the Army, there are, of course,
very many agents and means, which the head of the department can
employ; these will be touched on hereafter, but previous to entering
upon the personal requirements of an intelligence system, it will be
advantageous to fix accurately, the work that it is intended to perform
and the object it has in view.

The labours of an intelligence officer must be directed to one
point, and that is, to be on an equality with an enemy in as many ways
as possible, and the ultimate object is, to assist the strategy of our armies
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as many contingencies as can be foreseen. There must be then a cer-
tain amount of vagueness in the foundation of an Intelligence Depart-
ment, which can never be eradicated as far as England or India is con-
cerned. No one can say, where and when a war will break out, and
thus the task of an English intelligence department is considerably
greater than that of one in a country, whose well-defined borders march
with those of a national enemy; when a capital or important fortress is
the objective point, and to reach it in the best and shortest way, forms
the plan of the campaign. This vagueness, though increasing our la-
bours in a very great degree, should warn us not to delay in commencing
our Herculean task.

The only way of treating this difficulty, is to consider the rest of
the civilized world from a hostile point of view, and to learn all that we

them. Our enmity with some nations is more probable than others, and consequently it is with these, first, that we should occupy ourselves, and in doing so we must have recourse to History. The study of history, both in its general and military aspects, becomes the ground work on which the superstructure of an Intelligence department has to be erected. To be able, however, to draw correct deductions from history, it becomes necessary to study the country, of which it relates the past events, in every way, that can throw light on the chief actors and their surroundings, on the causes and effects of wars, the changes in the character, creeds and education of the people, with the consequent effects on the agriculture and commerce of the country, and any physical changes resulting therefrom. Tracing the history of the past, as far as it can be ascertained from trustworthy sources, the present, that is to say, the history of the present generation, has to be considered, with the continual changes that the 19th century has brought forth, the railroads, the telegraphs, the modern high pressure system of living—all these, with the character and known policy of the rulers, require to be brought into the mill of the Intelligence department, to be ground out into a systematised statement of facts, from which deductions may be drawn of a temporary nature, in so far, that they are bound to follow the ever recurring changes of this world; from these deductions, plans of possible campaigns can be prepared by the Head of the department, with the assistance of the second branch, that is, the geographical or topographical department, whose efforts have been bestowed on acquiring every species of information regarding the physical features of the country, its climate, rain fall, general health, water supply, food, resources, fortifications, cities, towns, villages, harbours, coast defences and boundaries, &c. without which special information, no speculative plan of operations can ever take a practical shape.

On these data alone, a completely victorious campaign may be imagined for our own army, marching without let or hindrance through an enemy's country; but the causes which operate against victory have also to be considered; these are, the enemy's army and navy and their respective systems; the population, the manufactures, civil and military, and the resources which sustain these manufactures, either in the way of commerce, or of indigenous raw material.

These are the elements which are opposed to the prospect of victory; they can be grouped into two classes, under the heads of Military and Naval, and Domestic Economy. To be able to give a concise precis of all the facts connected with these points, requires time and a special knowledge of the country; and for this purpose, the third or Statistical, (to follow the current nomenclature) department comes into play.

When all the facts necessary to be considered, are thus detailed by the three branches, the Historical, Geographical and Statistical sections of the Intelligence department, the task of collecting and weaving them together to whatever extent may be necessary, will devolve on the Head of the department. It is his work to carry out the ultimate object, the

duties of a department can be learnt in this short space of time, every branch of which requires a life long study, not much real good will result, either to the department or to the officers ; but if their attendance is only to be considered as giving them the advantage of learning what is going on, and how in their subsequent careers they can forward any particular branch to which they may devote themselves, then, undoubtedly, much good will arise to the Army and to the nation generally ; to the Army, in providing officers with an object akin to, yet different from, their professional duties, to which to devote their talents in their leisure time, and to the nation, in having the results of these labours carefully collected for future use. The many thoughts of many minds working independently towards a common object, cannot fail in producing a work of intrinsic and permanent value, but there must be a head to learn the combined lessons that the book will give. Reports of this kind require a better fate than a pigeon hole.

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preparation of campaigns, both offensive and defensive, and this portion of his duties cannot be entrusted to any one else. As a clearer idea will be gained of the great amount of labour that will be required, by giving a recapitulation of the work assigned to each section in a tabular form, the following detail will be of assistance. It must be borne in mind, that this information has to be collected, not with reference to any one particular, but as regards every nation and tribe, civilized or savage, where war may be expected to be carried on, as also in our own territories.

HISTORICAL SECTION.

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| Historical | ... 1 Internal wars, their objects ; whether fought without or with foreign assistance or allies. The party factions. |
| | 2 External wars, with whom fought and the causes. Whether allies were used. |
| | 3 General History. |
| Political | ... 4 Political History. |
| | 5 System of Government. |
| | 6 Parties. |
| | 7 Leaders. |
| | 8 Religions. |

GEOGRAPHICAL SECTION.

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| Geographical | ... 1 General Features and Climate. |
| | 2 Boundaries. |
| | 3 Mountains. |
| | 4 Rivers. |
| | 5 Coasts. |
| Topographical | ... 6 Cities, towns, and villages from a military point of view. Forts and fortifications. |
| | 7 Railways and Telegraphs. |
| | 8 Roads and Canals. |
| | 9 Harbours and Steamer Transport. |
| | 10 Coast defences, light houses. |

STATISTICAL SECTION.

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|----------|-----------------------------------|
| Military | ... 1 Organization of Army. |
| | 2 Numbers of Troops. |
| | 3 Staff and Military Departments. |
| | 4 Combatant Services. |
| | 5 Non-combatant ditto. |
| | 6 Tactics. |

	7 Disposition of Forces.
Naval	... 8 Organization.
	9 Numbers.
	10 Detail of Ships.
	11 Disposition of do.
Economical	... 1 Manufactures.
	2 Military Establishments.
	3 Schools.
	4 Arsenals of construction and Manufactories, Magazines, &c.
	5 Resources.
	6 Commerce.
	7 Population.

If one had to begin at the beginning, to collect the information that is required, to fill in the answers to the numberless questions that could be asked, under each of the divisions of the sections here given, it would be almost impossible to finish the work, as by the time the end were reached, the commencement would have to be revised and corrected; but luckily, in the 19th century, when there are books on every subject, it is possible, when one knows where to find it, to extract from them a great deal of what is wanted, and by carefully collecting various works on the same subject, to be able to arrive at a conclusion from the midst of diverse opinions. Following books in the order of importance, come the newspapers and other periodical literature of the day; from them, important facts can often be secured, which deserve to be rescued from oblivion till they can be tested; for the mere "ipse dixit" of any one, however willing to tell the truth he may be, can never be relied on, till it has been supported by independent testimony. Not only have our own journals and periodicals to be searched for what prizes they may yield, but foreign publications must be examined in a similar way; and every thing affecting their armies or the Intelligence department, has to be noted down to be tested when opportunity offers. Often a newspaper paragraph will disclose a state of affairs with which no one is acquainted, and, consequently, no one is interested in. It is passed over by the majority, and forgotten as soon as read by the minority; but it may contain important facts in a military point of view; as, for instance, when Russia intends to alter the localization system of her Army, or when Austria makes a radical change in the Militia of her Hungarian provinces; both these instances given, require to be noted down by those whose work it is to collect information as to these countries; but if it is no one's duty to do so, we shall remain in ignorance as to the Russian Army system; and the alteration that has been made in the Austrian armies.

The only test that can be applied to written or printed matter in books, is to ascertain their correctness by means of eye witnesses, who

can be depended on for judgment and ability. In matters of history, where books themselves are silent witnesses of the past, the testimony of various writers forms the only means of arriving at a decision; but in matters patent to the senses, the verification of a point about which there is a doubt, by a specially instructed individual, is the only means for a third person to form a satisfactory opinion. These eye-witnesses in times of peace may be paid or unpaid travellers; in times of war they would be called spies; they may be, and indeed, remain ignorant that they have imparted the information, that a clever questioner particularly wanted to draw from them; but it is to these men that an Intelligence department must look for its work. There is no necessity for such travellers in times of peace to be officers or soldiers; in war time it is different; but the advisability of employing officers and men, on duties as similar as possible to those they may be called on to perform in time of war, is obvious.

No number of officers that could be spared from their effective duties, could help very much in reducing the mass of information into a system, so that an Intelligence department must always depend upon other assistance in this matter; bearing in mind, that the means must always be adapted to the end. When a native of the country is a suitable agent, he should be employed in preference to the more educated Englishman; however there are cases in which an Englishman must be employed.

The success of an Intelligence department consists in acquiring information without seeming to do so. Disguises must, therefore, in many cases be adopted; but all is fair in love and war, or for its preparation, and, therefore, no disguise, however lowly, would be out of place, in acquiring the information that was wanted.

Arminius Vambéry underwent a long education to be able to travel, without fear of detection, in the society of durweshes through Turkistan; Burton travelled to Mecca as a Hajee, and Palgrave passed through Arabia as a Frank doctor. All these examples and many others, more or less known to fame, in the ranks of the Indian Army, show what can be done when in Eastern lands it is necessary to overcome the antipathy to foreigners and Christians; and the example of these travellers would be followed by men who sought to further the particular knowledge required for the use of the Army, as the travellers, whose names have been given, set out to increase the general knowledge of the Western World. The employment of natives, in some cases, has been very successful, as in the exploration of the Thibetan countries to the north of Assam, by the Pundits employed in the Trigonometrical Survey of India; and as by degrees, scientific education increases among every class of natives, soldier as well as civilian, it will be possible in time to obtain a very useful class of men whose services can be employed with advantage in Mahomedan countries, or in other parts of Asia whence we are now excluded.

The employment of paid travellers opens up another branch of the question ; the whole of the disbursements connected with the department, being under the immediate control of the Government of India, it follows, naturally, that the whole of the charges connected with travelling agents would, in time of peace, be considered by the special branch of the government under whose orders the travellers might be appointed ; for internal purposes, the appointment would rest with the Home Department ; for travels in other countries, the Foreign Department would be responsible ; but this would be no limit to the action of the Chief of the Intelligence, who would submit his recommendations to the proper authorities, either selecting an individual himself for employment, or leaving the nomination and salary altogether in the hands of the responsible department. The chief of the Intelligence, having been specially nominated from his known fitness for the post, and being in continual communication with government, it is probable that his views would naturally be adopted, and any selection he might make for a given object would be approved. Thus, in time of peace, the civil and military departments of government would work harmoniously together. When the information required can best be supplied by the Foreign Department, it would be made at once available to the Intelligence Office, and vice versa. The appointment of experienced travellers to diplomatic posts under the Government of India, show that the necessity of skilled and trustworthy agents is quite appreciated there, while the numerous civil and political officers, under the orders of the Home Department, are equally available to furnish the Intelligence Department, through their own superiors, with the information required to complete the official records of the Intelligence.

In time of war, under an altered condition of government, it should be in the power of the Chief of the Intelligence to purchase his information direct instead of secondhand, and he should have permission, either to draw "ad libitum" or up to a fixed amount, for the furtherance of his views ; and a similar power should be delegated to the General Officers in the field, to an extent that might be considered advisable, to enable them to reward at once, and without delay, givers of news that can be ascertained to be true. A little money judiciously made use of might prove a great saving in the end.

Intelligence during war time is so far different from intelligence in peace, that though delays are necessitated in the latter, by the circuitous mode of getting information that has been shewn to be necessary in some cases, yet in the former they must not exist ; the information that is wanted must be forthcoming at the moment it is required. time will not avail for making lengthened inquiries, if it has not been done beforehand, and delayed information may be worse than useless, as when in the invasion of Austria by the Prussians, a force specially posted to guard the exit of the defile near Nachod became powerless to do so, from not having been warned of the approach of the Prussians till they had passed through the defile in force, though there was a

special corps of observation detailed for the purpose of giving this information.

The subject of Intelligence divides itself into two branches ; the Intelligence of the Office, to be collected in peace, and the Intelligence of the Field. In the former, mental qualifications combined with an acquired knowledge of the wants of the Army, are the chief requisites ; while in the Intelligence department in the field, only soldiers of the first water can be employed with advantage. Physically and intellectually, and even socially, they must be picked men, and real soldiers. Sir Henry Lawrence and Sir James Outram are the high standards of excellence, by which one can form an idea of the qualifications required ; and unfortunately, it is difficult to find many living realities of this high ideal.

It is necessary, however, that these men, when found, should have able and qualified subordinates whom they can trust ; and in the field these can only be obtained from two sources, the ranks of the Army, and spies ; the latter, however, are notoriously untrustworthy, and dependence must be placed on one's own resources ; the army must be drawn upon to furnish in its degree soldiers of equal ability and qualifications to assist their superior officers ; and our endeavours must be directed to glean these men from the ranks, to train them into able assistants. To shew what can be done in the way of education of soldiers an extract is given further on, relative to the high standard of education existing among the non-commissioned ranks of the Russian Army ; and to describe the various means by which this result is arrived at, other quotations are given to show the existing military educational institutions in that country ; at first sight these may seem unconnected with the subject, but when it is borne in mind that the intelligent co-operation of every grade is necessary to arrive at success, it seems desirable to educate one's army to a degree, in which every individual soldier, especially of the Cavalry branches, can be utilized with confidence ; so that there shall always be a reserve, on which to draw, of selected men for special duties.

This subject of Intelligence during war requires to be considered separately ; but, previous to doing so, those instances, which the slender resources of an Indian library enable one to give, where the employment of previously collected information has led to satisfactory results or when its want has brought on disasters, must be considered to form a basis on which to work.

As far as can be ascertained from the published records of the English Intelligence Department, the systems which exist in Russia, Austria, and Prussia, for their respective Intelligence services, will be given ; but of necessity the outlines must be poor and unsatisfactory, the essence of the service consists in its secrecy, and though the outlines may be given, it will only enable a very rough idea to be formed of the working of the systems.

With this assistance, such as it is, and the experience gained in Indian modern wars, the endeavour will be made to work out the problem of forming an Intelligence department for India, which shall be equally capable of furnishing the materials for campaigns to be fought hereafter, as well as providing the means for carrying on future wars to a glorious conclusion; utilizing, as far as possible, the present systems, and adapting them to meet the changes which may be required; for this purpose, it will be necessary to consider the position of the Quarter Master General's Department, and how far it has succeeded in the object for which it was established.

CHAPTER II.

Extracts from the Military History of India bearing on the utility of information in time of war.

WITHOUT going back to the earliest period of Anglo-Indian History, it will, perhaps, be sufficient to refer to some of the campaigns from about the beginning of this century, to ascertain the lessons which they teach us.

In both aspects of the Intelligence department, both before, and during the continuance of war, the general lack of information, as a rule,* seems more striking, from the few recorded instances where the skilful use of previous intelligence led to satisfactory results.

The general apathy on this important point, can be accounted for in two ways. In the first place, it was but on very rare occasions that any Indian enemies were found, in the open, to resist the steady attack of English soldiers and sepoys, consequently, where valour and discipline told already so much in our favour, the leading idea, having found the enemy, was to attack him straight in front, till he was defeated and fled. There was, as a rule, no pretence of strategy and tactics, and not always an objective point to which operations were directed, beyond the immediate position where the mass of the enemy chanced to be.

Under these circumstances, where the finding of the enemy was not a difficult matter, nothing beyond this was considered necessary; nothing ever stopped an advance except high mud walls; no position which could be assaulted in a direct manner, was attacked in any other way, no ordinary difficulties ever checked the march to victory; nothing, therefore, was to be gained by making acquaintance with the ground to be operated on; and where no need existed, or seemed to exist, it was improbable that any very active endeavours should be made to establish a Military Intelligence department in the field.

The second reason why there has been no Military Intelligence

* Excepting the operations conducted by Major General Sir A. Wellesley.

Department in India is, that there has been, and still exists in a very modified form, a Political Intelligence department, which has usurped the functions of the former. Naturally, there is a border land in which these branches of an Intelligence Department can meet, but on each side of this, there is ample scope for the performance of the duties of each, without infringing on the special duties of the other.

The course of events in India in former days has been, on nearly every occasion, moulded by the personal influence and mind of the head of the Supreme Government, sometimes in opposition to the wishes and policy of the former rulers, the East India Company, who were obliged to acquiesce in results which raised their revenue, though they might not have approved of the means by which it was done.

To supply the head of the Government with facts and opinions on which to base his resolutions, by degrees, a series of Governor General's Agents were appointed, either at the courts of independent princes or of those who, their independence having been taken away by conquest became our feudatories. These Political officers formed, then, the intelligence department of the Government, and in cases of war, selections were made, as a rule, from their assistants, who were associated with commanders for the express purpose of affording them information of the character of the people, and resources of the country where they were to operate, and with the number and dispositions of the enemy. A blind obedience on the part of the military authorities to the dictation of the Politicals, who alone were supposed to know anything about the country, led, as may be imagined, to the utter want of ordinary prudence in the conduct of war, and no better instance of this can be given than before the battle of Moodki "when Major Broadfoot (a Political officer,)" who was sitting at luncheon with the Governor General, received a scrap of paper. Looking on it, he rose with the exclamation, "the enemy is on us!" He rode to the front, and passed the word along. When the British troops were forming, he returned from his reconnaissance, galloped up to the Commander-in-Chief, and, gracefully saluting him, pointed to the rising cloud of dust ahead, and said, "There, your Excellency, is the Sikh Army." It was the Political Agent making over the frontier to the soldier."

Thus the story is told, with a pardonable degree of pride, by Sir Henry Lawrence, as a brother political, as an eulogy on the conduct of Major Broadfoot, who deserved all that could be said in his favour; but the instance shews the fault of the system, not of the individual. Here was an officer who received sufficiently important notice to affect the whole army, and, from the account given it appears that the very first person to whom the information should have been given, is the very last. No wonder that the system should have roused the ire of Sir Charles Napier, who inveighed strongly against Military Political officers. Another point is clearly brought to light in this story, which shews how the whole of the intelligence being in the hands of the Political officers, who were not responsible to Military Authorities, led to the general

want of information which could have allowed an enemy, who was expected, to very nearly surprise the force ; the Commander-in-Chief had troops enough to ascertain the movements of the enemy, and that he did not do so, is evident.

Doubtless the Intelligence system, as conducted by the Political Officers, was better than none, and as good as it could be under the circumstances, but it was not an efficient system ; its deficiencies were brought to light by Sir Henry Lawrence, and it was with the view of meeting this acknowledged defect that the Guide Corps was established.

The same causes which led to the neglect of the Intelligence department during war, operated against the collection of information during peace, for though the formation of the Quarter Master General's Department was resolved on for the special purpose of collecting and collating the information that was required for Military purposes, yet during the thirty years it had at that time been in existence, it could not well have fulfilled this purpose, else its shortcomings would not have been adverted to, and remedies proposed by Sir Henry Lawrence.

The Political Officers were relied on to furnish the information required previous to war, but by acting on the uncorroborated information of any one man, however clever and intelligent he may have been, the chance of any error on his part being discovered in time to obviate accident, was completely set on one side.

The first Burmese War was planned on the reports of one officer (he may only have been a traveller and not a Political officer), but some, if not most, of his data being incorrect, the campaign was very nearly brought to an untimely end, at an immense expenditure of life and money.

In the above case a war was undertaken in a foreign country, with perfect reliance on the opinion of one man, but in the fourth Mysore War, when the leaders had nearly all gained some experience of the country, by having served in the previous war, the campaign was also very nearly brought to a stand still, owing to the loss of baggage and transport animals from sickness, owing to the effect of the climate on them. No former Indian campaign could have been undertaken with better auspices of success, but though it ultimately succeeded, it shows the necessity of a most thorough knowledge of a country in which operations are to be carried on, not merely a knowledge of the road to be traversed.

The following extracts from Marshman's History of India, tell their own tale as to the general want of information, which was the rule, both before and during wars in India, relieved only by a few instances, where the skilful application of locally acquired knowledge enabled movements to be made which resulted in victory, but these instances are rare.

Extracts from the History of India.

The Fourth Mysore War.—In 1798 Tippoo Sultan formed an alliance with the French republic to expel the English from India, and he received the assistance of the French in organizing his army of 600,000 men, a large part of which was the celebrated Mysore Cavalry ; he possessed also a large force of Artillery, and baggage, and draught animals of all kinds. To oppose this Army, the only force that was available numbered 8,000 men, without transport or commissariat. The previous attack on Seringapatam, with a completely equipped field force, in 1791, had failed, and the bold policy of Lord Wellesley in ordering a second attack against Tippoo, seemed alarming to those who were acquainted with the poor resources of our Army on the coast. In six months this army was raised to over 20,000 men, of whom 6,000 were Europeans, with a train of 40 guns and 64 field pieces. The Army was fortunate in its superior officers, all of whom, with one exception, had gained experience in the previous Mysore War, and General Harris, who commanded, was personally acquainted with the route. A second force of 6,400 men was despatched to co-operate from the Bombay side, and Tippoo's efforts were first directed to crush this force, which was in ignorance of his neighbourhood ; Tippoo having spread the report, that he was going to attack General Harris. Luckily, the position of Tippoo's force was discovered from the top of a hill by a native ally, the Rajah of Coorg, and he informed General Hartley, the officer who commanded the advanced Brigade of General Stuart's force.

"Tippoo attacked the advanced brigade and fought gallantly for six hours, till General Stuart, coming to their assistance, defeated him with the loss of 2,000 men. Some time after his retreat he marched to attack General Harris, with whom he fought at Matavelly, again meeting with defeat and the loss of 1,000 men. After this, thinking that General Harris would take the same road to Seringapatam that was taken by Lord Cornwallis, he had it laid waste, and not a particle of dry forage or a pile of grass was left unconsumed. The chief of the Guide Corps and Captain Macaulay were sent southward to examine another road, and they returned with the information that this one lay through a fine open country, and that the ford at Tosella afforded every facility for the passage of the Army ; on which the army crossed the river and found an abundance of pasturage for the famished cattle. The selection of this route facilitated the junction with the Bombay Column, and besides, rendered abortive the disposition which Tippoo had made, for defending the northern face of Seringapatam.

"The difficulties of the march of General Harris' Army, led to the same embarrassments which had defeated Lord Cornwallis' expedition in 1791. On the third day of the march, every store, which could possibly be dispensed with, was destroyed to increase the available carriage ; and as the army advanced, the loss of powder and shot from the failure of carriage cattle, created serious alarm. This was said to be owing to the

climate of Mysore being unfavorable to cattle of the Carnatic. Owing to these causes, the army could only advance at the rate of five miles a day, when every hour was of importance, as it was necessary to besiege Seringapatam before the rains set in, when, from its position on an island, it became impregnable owing to the rise of the river Cavery. Two days after the junction of the Bombay force, it was found that there was only eighteen days' food for the combatants, and when the breach was reported practicable, on the 3rd May, there were only two days provisions for the force left. The attack was luckily successful."

From this short summary of the fourth Mysore war, the following deductions may be made, with particular reference to the Intelligence Department :—

1st.—The necessity of sifting carefully all reports regarding the movements of an enemy in the field.

2nd.—The advantage to be gained by having a faithful native ally, like the Rajah of Coorg, to aid in gaining intelligence.

3rd.—The advantage of a Guide Corps in exploring the country.

4th.—The necessity of previously ascertaining the effect of the climate on the carriage cattle.

5th.—The necessity of regulating the transport services, so that useless stores should ever be taken on an expedition.

" On the fall of Seringapatam papers were discovered, which shewed that the Nabob of the Carnatic, who was an ally of the British, had kept up a clandestine correspondence with Tippoo, in a cypher, which was also found, and had thus conveyed to him intelligence and advice. Owing to this breach of treaty, the Carnatic was annexed, and placed under British protection."

To be able to profit by " combinations of fortunate circumstances" which the chance of war throws in one's way, is essentially one of the duties of an Intelligence department in the field, so that it becomes necessary to have some of its members acquainted with the language of the country, not in a general way, sufficient for ordinary intercourse, but with the special knowledge required to interpret cypher messages in a foreign tongue.

Another instance may be added of the importance of this qualification. Two intercepted letters, one from the Rajah of Berar to the Nizam, and the other from Scindia to the Peshwa, disclosed the intentions of the coalition of Mahratta princes in 1803, while they were protesting their desire for peace, and enabled Lord Wellesley to declare a war, which resulted in the considerable extension of the Company's dominions. This war would naturally have broken out, but the possession of the two intercepted letters enabled preparations to be made, which struck at the power of these princes simultaneously, in districts 700 miles apart from each other.

Mahratta War 1803.—Before the battle of Assaye, General Wellesley was misled by his scouts, as to the actual position of the confederate Army, and found himself, on the 23rd September, within six miles of them, when he expected to be twice that distance. He was also assured that they were on the point of retiring, so he resolved to attack them without waiting for Colonel Stephenson's force, with whom the attack should have been made on the 24th September. The Mahrattas, numbering 50,000 men, of whom 10,000 were trained sepoys, occupied a strong position, but were, nevertheless, defeated by a handful of British troops, under 4,500 men. Had General Wellesley's information been more correct, this battle would have been fought, as planned, under more favorable circumstances, and the loss of one-third of his force, the price of the victory, would have been avoided, though part of this loss was due to disobedience of his orders and not to his dispositions.

1804.—After the defeat of the coalition of the Mahratta Princes, the only native force in the field was that of Holkar, who after a successful career of plunder in Central India, decided to attack the British forces under Lord Lake. As the rainy season was approaching, Lord Lake, instead of following up and pressing the advantages he had gained against Holkar, withdrew his forces into Hindoostan, sending Colonel Monson, with a single brigade, to follow Holkar. The force was unaccompanied by a single British soldier; it had no commissariat or means of crossing the swollen rivers, and it marched 200 miles away from its nearest support, to find, at the end of the time, that there were only two days' provisions in camp. The force began to retire, was attacked by Holkar, who was defeated, but the retreat was hindered by the Rajah of Kotah, who refused admission to the force into his territories. The rivulets were all swollen, the guns sunk into the soft mud, were abandoned and spiked, and notwithstanding a reinforcement of two battalions, a regiment of cavalry, and provisions, the retreat became a rout, when the expected assistance of Scindia's General, who instead went over to Holkar, was found to be a delusion. Fifty days after the retreat had begun, the last sepoy straggled into Agra. This was the most signal defeat that the British had experienced since 1780, and our prestige suffered accordingly."

The conclusion to be drawn from this expedition is, that had Colonel Monson, who was a brave soldier but a bad General, had the assistance of an efficient intelligence department, the expedition might have been as successful as a similar one under Colonel Carnac, who found himself in the heart of an enemy's country, destitute of provisions and harassed by an active enemy, abandoned also by his native allies; yet he turned the tables by a bold stroke (a night attack) on Scindia, captured his guns, and obliged him to sue for peace.

Had Colonel Monson's plan of campaign been previously worked out, his communications assured, and even his artillery left behind, considering the nature of the country and the time of the year he was called on to operate in, he might have been equally successful.

1805, *First Siege of Bhurtpore*.—"At the close of General Lake's victorious campaign against Holkar, he resolved to attack Bhurtpore, where the remnant of Holkar's Army had taken refuge. Without a siege train or engineer officer of experience, without making any reconnaissance, the siege was undertaken. Four unsuccessful attacks were made, and after several months the siege came to an end by the voluntary submission of the rajah."

Here again, the want of an intelligence department in fixing before hand the requirements of an army in the way of siege trains, and for the attack of Mud Forts, is evident.

1814, *The Goorkha War*.—In the Goorkha campaign, four separate columns were planned to invade Nepaul. One, under General Gillespie, attempted to reduce the Fort of Kalunga, without a siege train, and failed. After a month's delay some heavy ordnance was obtained, but when a breach was made, the attack failed, chiefly, it is said, owing to the dislike of the British infantry regiment for their commanding officer, under whom they would not fight; and at last the fort of Kalunga was abandoned by the Goorkhas after three days' shelling. General Gillespie was killed, but this force, under his successor, contented itself with blockading another mud fort, after having lost two large detachments which were cut up.

The second column under General Wood, after much delay, penetrated into Nepaul, and as no reconnaissance had been made, it fell into an ambush through the treachery of a brahmin guide. The General sounded the retreat, though the enemy had begun to abandon the post, and retired within the British frontier, making no further effort. The third division, under General Marley, was even less successful than the two previous ones. Two unsupported detachments were sent out twenty miles, east and west of his head quarters, and as no military precautions were adopted in these posts, the Goorkhas captured them. General Marley retreated and could not be persuaded to re-enter the forest, and at last rode away into Dinapore, without appointing a successor. General Ouchterlony commanded the fourth column, which was to act in the difficult country of the Upper Sutlej. Copying the tactics of the enemy, he built stockades for his detachments, which saved them from being overpowered. He carried his siege train with him, and by its means he reduced at the beginning of the campaign the fort of Nalagurh, and after a five months' winter campaign he had reduced every fort opposed to him, and put an end to the Goorkha Army.

The lessons that can be learned from this expedition, which was well planned but ignobly carried out in three instances, teach us the necessity of obtaining accurate information previous to undertaking a campaign. The only redeeming feature in the expedition was the success of General Ouchterlony's force, which resulted from the appreciation that officer had, both of the country and the enemy; doubtless, to gain this knowledge he must have been largely assisted by others.

The concluding episode of the war forms as striking an example of the value of an Intelligence Department, as the previous instances of the demoralization of three columns, shew incapacity in their leaders conjoined to want of Intelligence.

The treaty made with Nepaul had hardly been signed by the Governor-General, when the Nepaul Council resolved to repudiate it, and announced their resolution to continue the war. A force of 20,000 men was again rapidly collected under Sir David Ochterlony who found, on emerging from the forests on the 10th February 1816, that the works of the Goorkhas were utterly unassailable. But Captain Pickersgill, of the Quarter Master General's department, had discovered a route to the left, which, though incomparably difficult, would enable the General to turn the enemy's flank. The enterprise was the boldest effort in the whole course of this mountain war, but it proved completely successful, and at once decided the issue of the campaign. During the night of the 16th February General Ochterlony marched in dead silence through a ravine, where twenty men might have arrested a whole army. By seven in the morning, the heights to the west of the enemy's position were gained without resistance; after a march of fifty miles to Mukwanpore, where the Goorkhas made their last stand to be defeated, the campaign ended on the 2nd March 1816, by the treaty being returned signed.

Pindari War, 1817.—An instance may be given on a smaller scale, to show the necessity for an intelligence department for detachments in the field when moving separately, especially as the instance to be quoted recalls one of the most gallant fights in the whole of Indian History.

Battle of Corygaum.—"At the conclusion of the Pindari War in 1817, the Peshwa, closely pursued by General Smith, was at a place Ioonere, sixty miles north from Poona; which latter place he gave out that he intended to attack. The commandant called in to his support a detachment under Captain Staunton, composed of one battalion of infantry, three hundred irregular cavalry, and two six-pounder guns with twenty-four Europeans. He commenced his march at 8 P. M., and at 10 A. M. reached a place sixteen miles from Poona near the village of Corygaum, when to his surprise, he perceived the whole of the Peshwa's army, 25,000 strong, encamped on the opposite bank of the river Beena. The Mahratta troops were sent immediately to attack this handful of soldiers, who were jaded with their long night march and destitute of provisions and water. Throughout the day (it was in the month of November) the exhausted sepoy kept up the fight though frantic with thirst, disputing every inch of ground, and re-taking one of the two guns which the enemy had captured, and thus they kept the whole Mahratta army at bay, till the near approach of General Smith caused them to retire on the following day. Of the twenty-four artillerymen, twenty were killed and wounded. This action, besides shewing the necessity of information in the field to prevent unequal engage-

ments of this kind, was remarkable as shewing the fortitude of the native soldier without the assistance of Europeans to back him up, when not only numbers, but hunger and thirst, were against him."

First Burmese War, 1824.—"At the commencement of the first Burmese War, the Government of India was profoundly ignorant of the national mode of war of the Burmese, of the military force and resources, population and geography of the country, and of the approaches to it from our own country. The Commander-in-Chief, Sir Edward Paget, was strongly opposed to a movement on the land side of Burmah, and the plan of the campaign was drawn up by Captain John Canning, who had traversed the country and visited the capital; it was, unhappily, on his knowledge that the Government placed its sole dependence. He represented that the occupation of Rangoon, the port of the Irrawaddy, would paralyse the Burmese Government, and that the means of constructing a flotilla to sail up the current of that river, with the assistance of the monsoon, as well as provisions and draught cattle, could be had there in abundance. Consequently, it was decided to land at Rangoon as the rains set in, the first and most fatal error in the campaign, for the troops landed in May 1824, to find Rangoon deserted by the inhabitants, who had fled into the jungle taking their provisions and cattle with them. No means of reaching the capital by water were available, and the army spent six months of inaction to be decimated by fever and dysentery, brought on by the malaria of the swamps round Rangoon, and bad provisions, for though cattle could have been obtained in the neighbourhood, the Government had forbidden them to be killed for fear of offending the prejudices of the natives; and the troops were fed on putrid cured provisions for two months after this state of affairs was reported in Calcutta. When it became evident that nothing could be done at Rangoon, the Commander-in-Chief, changing his opinion, organised two forces, one to proceed through Cachar and Munnipore upon Ava, and the other to penetrate through Arracan and to cross the Yomadawu hills to go up the valley of the Irrawaddy to the capital. Both expeditions proved abortive. The first force advanced within ninety miles of Munnipore, but failed, owing to their impedimenta, to traverse the hilly jungly country of the Looshais in the rains.

The second column was still more unfortunate, taking three months to march down the coast, a distance of 250 miles from Chittagong. Ultimately it ceased to exist, as an organised body, one-fourth having perished by disease, and two-thirds of the remainder being in hospital with Arracan fever.

At last, when the Rangoon force advanced in two columns, one by land and the other by water, the second phase of the expedition very nearly terminated on its reaching Promie, a distance of one hundred and fifty miles in ten weeks, where it was proposed to act on the defensive during the rains, but Lord Amherst decided the most effectual way to finish the war was to push on, and Sir Archibald Campbell, who commanded, reached Yundabar, with 1,300 men, out of the 11,000 European

and native troops that landed at Rangoon, and with this handful he defeated 16,000 Burmese, on which the king of Burmah signed a treaty of peace and the war was concluded, after having cost thirteen crores of rupees and being fatally mismanaged from its outset. It was only remarkable for want of judgment and perpetual delays, and was unredemmed by a single stroke of generalship in the presence of a contemptible enemy."

Had some portion of the thirteen crores of rupees been previously spent on the acquisition of the knowledge of the country, it would have saved, not only a great part of the remainder, but also many valuable lives.

The second siege of Bhurtpore, 1826.—The experience gained in the first siege of Bhurtpore was utilised in the second siege to great advantage.

"At a short distance from the town there was a lake separated from it by an embankment, which, in the previous siege, the defenders had cut and thus filled the ditch with water; on this occasion they had commenced the same operation, but by the timely arrival of a British detachment and the exertions of Captain Irvine, the flow of water was checked and the breach repaired. A few minutes delay would have altered the whole result of the siege.

"The fort was ultimately taken by mining, a mine of ten thousand pounds of powder having been exploded to destroy the walls, when smaller mines had proved useless. The mud walls of the fort could not be breached by artillery fire, not having suffered much from the fire of forty-eight pieces of ordnance for many days."

The Gwalior Campaign, 1843—One of the most remarkable instances of neglect of procuring information, as regards the enemy, that could be found even in India, occurred at the battle of Maharajpore on the 22nd December 1843. The enemy (Scindia's troops) had during the previous night advanced to Maharajpore and carefully entrenched themselves with their formidable batteries of 20 heavy guns in front.

"The advance of the British Army was looked upon in the light of a military promenade, and was accompanied by the Governor-General and the ladies of the chief officers of the staff on elephants. There had been no reconnaissance in the morning, and the enemy's change of position was unknown to the General, Sir Hugh Gough, and it was not till the fire of the masked batteries at Maharajpore rudely disturbed the advance, that the presence of the enemy was discovered, and that he had occupied the place selected for the breakfast place of the Governor General. Naturally the result of the surprise was to throw the army into a confusion which lasted all through the fight.

"The siege train which alone could cope with the heavy ordnance opposed to it, had unaccountably been left in the rear, and the field artillery pieces were soon upset and put hors de combat by the superior

ordnance. Of course Scindia's troops (14,000), without a leader, were ultimately routed by the 12,000 of whom 1,000 were killed and wounded under Sir Hugh Gough, but as an example of conducting an army blindly and without information in the neighbourhood of an enemy, this instance can hardly be surpassed."

Sufficient extracts have been made to show, that both in the larger operations of war, as well as in the smaller undertakings, both divisions of the Intelligence department had not received much attention. Neither were campaigns planned as a rule beforehand, or if planned their execution was marred by the want of field intelligence; nor was there any system* which inculcated the necessity of obtaining security in the field by ascertaining the dispositions of the enemy. The disastrous Cabul campaign, which followed those from which extracts have been given, was no exception to this state of affairs, and it was only in the Punjab campaign that any improvement could be observed and then even the want of an Intelligence department was sufficiently felt to be brought prominently to notice by Sir Henry Lawrence, and as they bear in a measure on both these last mentioned campaigns his remarks will form a fitting conclusion to this chapter.

"What we have said regarding the Engineers, applies even more strongly to the Quarter Master General's Department; at best, but the shadow of an Intelligence Corps, consisting as it does of eight or ten officers, and these not selected for peculiar qualifications as linguists or surveyors, and not having any permanent establishment of non-commissioned officers or privates under them. In fact, it may be said, with more need of an Intelligence Department than any other Army in the world, we are worse supplied than any other Army. A handful of officers, however well qualified, does not form an establishment or department, and it is a cruelty to impose on officers important duties, involving often the safety of Armies, without placing means at their disposal. When the Army of the Indus assembled at Ferozepore, we are credibly informed that Major Garden, the Deputy Quarter Master General with the expedition, had not a single European at his disposal and not a dozen classics. Three officers were then appointed without any experience as intelligencers and altogether it may be said the Army marched as if it did not require information; as if the Commander had perfect maps of the country and had some special means, independent of the legitimate channels, for acquainting himself with what was going on in his front and flanks."

"The exertions of Major Garden are well known, and if he had been shot, as might have happened any morning, the Bengal Division would have been without a Quartermaster General's Department. Colonel Wild, it is well known, was sent in December 1841, on perhaps as difficult and hazardous an undertaking, as has for many years been entrusted to an officer of his rank, with four regiments of Native Infantry and one hundred Irregular Cavalry, a company of Golundauze with-

* General Wellesley's system appears to have been lost sight of.

out guns, and one of Sappers, the two latter being under officers of less than two years' standing, and without staff of any kind, Quarter Master General or Commissariat. A regimental officer was for the occasion appointed Brigade Major, and with him began and ended the Staff of Brigadier General Wild, who, had he had half a dozen guns and as many good Staff officers, might have reached Jellalabad early in January 1842, and have thereby averted the final catastrophe at Cabul."

When the attention of the Indian Government under Lord Ellenborough's administration, was turned, owing to the passage of our troops through the Punjab, to the internal condition of the Sikh States, there was much to cause alarm at the prospect of the dissensions which were likely to arise on the death of our ally, Runjeet Singh, whose turbulent troops, though kept in hand during his life, would then become the actual rulers of the country.

Previous to leaving England to assume the appointment of Governor-General, Lord Ellenborough had been advised by the Marquis of Wellesley, to keep the Army up to a war footing. "I need not," he wrote, "observe to your Lordship that an army unequipped with all the necessaries for prompt movement, is no instrument of war but a mere useless burden. At all times, therefore, the British power in India should possess, and maintain in activity and discipline, an adequate army in the field." To guard against the expected invasion of the Sikhs, at whatever time it might happen, the beginning of the army of the Sutlej was formed, and stationed at the frontier stations of Ferozepore and Loodianah. It was a small beginning, and though it was an act of political prescience on the part of Lord Ellenborough to station corps of observation on the frontier, yet there must have been a lack of sufficient information as to the strength of the Punjab Army, for otherwise, to place two somewhat isolated detachments of comparatively weak strength on the frontier, with their reserves at some distance, would seem to be tempting an attack which could not be warded off.

It was due to the able military mind of the following Governor General, then Sir Henry Hardinge, to be able to foresee with greater precision the course of events; so that before the storm burst, the garrisons of the frontier stations had been doubled and trebled in strength, the reserves were sufficiently near to be of use, and supplies collected immediately on the first sign of the war, which ended at the battles of Moodkee and Ferozeshah after a campaign of ten days.

It was a lucky day for the power of the English, when an experienced soldier like Sir Henry Hardinge ruled in India, who could, in anticipating the course of events, make his dispositions accordingly, ready to act calmly in every emergency.

It may have been owing to the opportunity he had of associating with Lord Hardinge, that Major Henry Lawrence was led to direct attention to the necessity of an Intelligence Department, or he may have only published the results of his own experience,

when in writing upon Lord Hardinge's administration, he wrote as follows: "During the war precise information was seldom procurable. Many good and able men were employed in procuring intelligence, but the Indian Army, possessing no establishment trained in peace to procure the information required in war, can never be more than partially successful in this respect. The thing is not to be done in a day. A Quarter Master General, or a Political Officer, may in himself be all ability and energy, but unaided must fail to secure accurate information. All this requires known and tried native agency, men who have a stake in the state. Serving against Asiatics we can never have our Colquhoun Grant, who will enter the enemy's lines and ascertain their state and preparation, but there is no reason why we should not have imitators of him in our Native Army.

To pay men, teach them, trust them in peace, and thus to have them ready in war, is the best policy. We shall then have men whom we can rely on, instead of chance comers who may be honest, but if energetic and able are too often serving the enemy rather than us. Thus it has ever been, since Hyder Ali sent his shoals of Hurkarus to deceive and mislead our generals, down to the late war, when as in all previous campaigns, the intelligence department had to be formed after hostilities had commenced. Lord Hardinge has in a measure provided the nucleus of a remedy, and in the small Guide Corps raised on the north-west frontier, has given the means of acquiring information, and proposed a body of men to meet further contingencies.

CHAPTER III.

Instances from Modern Warfare shewing the necessity for, and advantages of, Intelligence Systems.

IN carrying out the programme of subjects suggested, on which to form the basis of facts to build up the Intelligence department, it would be difficult to find the required instances, without the aid of a library such as can be in the possession of, or within the access of, but few residents in India. In every war there are some of these incidents but they are not always to be found in the mere recital of a campaign, which is founded upon general orders and despatches; in these the facts of the war are detailed, but generally the means and source of information are carefully kept in the back ground, so that to be able, without having been on the spot and engaged in the campaign, to separate the instances where good intelligence supplied the place of good luck and bravery combined, would be difficult. Personal histories often fill up these gaps in the accounts of campaigns, but they too are not to be found when required; consequently, when the information which would otherwise have been unprocurable is to be found collected in a measure, no apologies would seem to be required for giving wholesale extracts.

The instances in modern warfare given in this chapter, in which information was lacking, or where it proved beneficial, have been taken from a Belgian pamphlet* on the employment of cavalry, as it is to this branch of the service that foreign armies look for information in the field.

In 1814, Napoleon proved by his fights at Montmirail, Champaubert and Etoges the importance of an extended observation of his flanks by means of cavalry. On the other hand, it was from not having sufficiently watched his left flank in the direction of Lezaune that Blücher experienced a series of reverses, which cost him five to 6000 men and condemned his army to the defensive.

In 1813 the Allies did not know how to employ the 25,000 cavalry soldiers they had at their disposal, in reconnoitring the approach and the movements of the enemy, which they could have easily done by an intelligent use of their cavalry.

At Waterloo, the French discovered too late the approach of the Prussian Army because they had neglected to gain intelligence in the direction of Wavres, they had committed the same fault at Dennewitz against Bulon.

Of all the military powers of Europe Russia is the richest in cavalry. The services which she has been able to get from this arm are incalculable. In 1812 the Cossacks saved the Empire.

The Russian Cavalry seems to have remained faithful to its traditions, and the Crimean War offers a well-known example of a well-organised service of observation. A Russian Corps d'armée, commanded by Prince Radzivil, was charged with the blockade of Eupatoria. The allied troops which garrisoned the place were composed of five divisions of infantry and three of cavalry. Within musket shot of the outposts of this army, was established as a fixture a Cossack, and a little further on a post of five or six Cossacks, who could perfectly observe the whole position. The garrison of Eupatoria made several sorties, with the view of getting rid of this continual restraint, and of reconnoitring the forces which were opposed to it. Scarcely had the allied army passed its grand guards, when the Cossack fell back to his post keeping at musket shot distance. As the advance continued, the small post retreated in its turn; at a distance of two or three kilometres a squadron was met with; further on, three or four squadrons; still further on a brigade with artillery; at last at a distance of 25 to 30 kilometres the force found itself in the presence of 32 to 40 squadrons supported by infantry. Arrived at the end of its first stage, the force bivouacked in view of the

* Etude sur l'Emploi des Corps de Cavalerie au service de sûreté des Armées, par A. Fischer, Major au 2nd Chasseurs à Cheval, Conférences Militaires Belges.

enemy, and on the next day, it continued its operations, but at the end of the second day it found itself in front of a formidable position defended by a considerable army. The allied army then commenced its retreat to Eupatoria, followed or rather escorted by the Russian Army, which gradually melting away left at the end its Cossack, whose position was invariably the same. This remarkable fact reported by several military publications, shews us the example of an army guarded and kept informed at a distance of 50 to 60 kilometres, knowing every movement of the enemy down to the smallest details, while perfectly covering its own.

To cover, to enlighten, to protect marches, are the most important operations of a campaign, the more important as the means of carrying them out are rapid. From this point of view the role of cavalry does not seem to have been understood in the campaigns of 1859 and 1866. The methods followed were those laid down for service in the field, but experience has shown that these rules were insufficient, for although they afforded protection, yet no information was gained, the armies marched blindly, and were led into giving chance battles on meeting, like Magenta and Solferino.

On the 22nd June, the French army, behind the Chiesa, was a day's march from the Austrian army, which was in rear of the Mincio. During the day of the 23rd, reconnaissances were made, but both armies did not go far enough, did not explore enough ground, and brought back insufficient information. On the 24th both armies set off, the French, hoping to reach the Mincio, without fighting, and the Austrians thinking they could arrive at the Chiesa, in time to defend its passage. They met each other unexpectedly, and fought an unforeseen battle.

On the 23rd June, notwithstanding the nature of the plain of the river Po, and of the Quadrilateral, the Italians ought to have used their division of Cavalry to gain information and to put themselves in contact with the enemy, to have pushed on as far as Verona and Rovigo even, to have ascertained the positions occupied by the Austrian Army. The forgetfulness of this elementary principle led to disastrous results: the following day, the Italian columns, surprised in their march, engaged in a chance encounter and were defeated. In the Austrian Army, on the other hand, the brigade Puls, skilfully led, brought back precise information about the Italian Army of the Mincio."

In the Austrian War of 1866, the Prussian cavalry marched in rear of the columns and was seldom, or only badly, employed in gaining information; and on the Austrian side, but little better use was made of their well drilled and well mounted cavalry. The divisions of light cavalry, organised for the same purpose as the corps of American light cavalry, were intended to act as independent bodies, but the result was not equal to the expectation, as they were employed under the immediate direction of the head quarters which had concentrated in its hands the special intelligence service. In fact it was only through the intervention of the head quarters that the independent divisional cavalry gave

information to those parts of the army that they were immediately covering. The inconvenience of this system made itself felt on several occasions. It was thus that the corps of Ramming was pushed forward to the position of Nachod, when to its divisional cavalry was added the division of Holstein cavalry, with the same object of watching the defile. The independence of this corps in its relation to that of General Ramming had this result, that on the appearance of the enemy, it gave information to the General in Chief, without passing it on through General Ramming, and when at last he was informed, he was no longer in a position to stop the enemy at the mouth of the pass of Nachod.

The general conduct of the war in Bohemia was not of a nature to lead one to expect the great part that the Prussian cavalry would play in the campaign in France.

The plan of the German operations was to place their three armies on the left bank of the Rhine, so as to take the offensive as soon as possible, to pierce through at first the French lines which were of but little depth and too scattered to offer any serious resistance, then to beat in detail the principal masses, which, on account of their dissemination, could not assist each other in time. This first phase of the campaign required to be conducted with circumspection and certainty. It was necessary above every thing, to gain intelligence up to great distances, to be informed, without ceasing, of the movements of the French, while protecting themselves with an impenetrable curtain, which would allow both the security of the operations, and the choice of the point of attack. The clever use to which the German Staff knew how to put their squadrons to gain this end, had a leading influence on the first events.

Patrols of five and six horsemen were thrown on to French territory with remarkable audacity, and they furrowed it in every direction, making rapid marches of 30 to 35 kilometres. These patrols pass through villages, destroy telegraph lines, break up rail roads, throw terror into the country they overrun, coming and disappearing like the wind; furnished with maps, these horsemen do not go in a haphazard fashion, they know the ground and march without hesitation. The fear of their falling into the hands of the enemy does not affect the staff, which directs their movements; if some patrols are carried off, others escape and fulfil their mission; some horsemen will be killed, but the survivors will report on what they have seen and observed. The loss of a few men can never be taken into account, compared with the end to be reached. In the last days of July, while the outposts were skirmishing at the frontier, parties of German cavalry having crossed the Rhine, the Lauter and the Sarre, pushed on to Nieder Broun, Woerth, and Sarreguemines, to reconnoitre the French positions and to destroy the rail roads.

Thanks to the activity of its cavalry, the German Staff was kept constantly informed of the slightest movements of the enemy and could act with certainty.

The French cavalry under these circumstances is far from being as useful. Badly drilled as to the duties of outposts, its want of practical experience and its ignorance of the ground on which it is working makes it hesitating ; its information is generally nil—or at best insufficient. The French Army cannot get rid of its spirit of routine, and acts as it did in the Crimea and in Italy. The cavalry limits itself to watching the frontier, but instead of acting in weak detachments, large bodies are made use of on this duty, which are soon worn out against an enemy who, always in motion, harasses and fatigues it, while itself it cannot be caught. Constantly surprised, while their adversary acted with full assurance, it was not long before the course of events caused their want of a good system of outpost duties, studied and practised in the time of peace, to be cruelly felt by the French.

To extract instances in the last Franco-German War, where the want of intelligence on the one hand and good arrangements for an Intelligence system on the other, led to defeat and victory respectively, would be to rewrite the whole history of the campaign, especially in its first phases, where from the surprise of General Douay at Reichshofen, and the defeat of MacMahon at Woerth, in every action that was fought, the same story is told ; the Germans were acquainted with every movement of the French, while the latter were ignorant of the numbers and position of their enemies. The third French Army brought into the field, would seem to have learnt something of the Prussian system of handling light cavalry, for it was by means of a clever reconnaissance, executed by General Abdelal that General d'Aurelle de Paladines was made sufficiently acquainted with the German position, to attack General von der Taun and defeat him at Coulmiers, gaining the only success in the war.

Subsequently, after the Army of the Loire had experienced several reverses, it was decided that it should retire behind the river Sarthe partly in the expectation, that if followed by Prince Frederic Charles it would enable General Bourbaki to operate more freely towards the north-east, but Prince Frederic Charles contented himself with observing both armies with a thick screen of cavalry, till other troops could be sent against Bourbaki ; when he was able to act against Chanzy whom he defeated and drove beyond the Mayenne.

CHAPTER IV.

The existing systems of Intelligence in Russia, Austria and Prussia, with remarks on the system of Napoleon the 1st, extracted from L'Art de la Guerre.

THE RUSSIAN INTELLIGENCE SYSTEM.

“ 1st.—The Military Cabinet under the War Minister.

2nd.—The War Ministry, divided into 12 sections, the fifth one of

which is the Head Quarter Staff, which has under its control the following branches.—

- A The Military Topographical Institution.
- B The Military Scientific Committee.
- C The Nicholas Academy of the General Staff Corps.
- D The General Staff Corps.
- E The Military Topographical Corps.
- F The Courier Corps.

The other eleven sections are connected with the various other branches of military administration, the fifth one above referred to having, in addition to the points specifically entered, charge of the personnel, distribution and administration of Cavalry and Infantry.

The General Staff Corps includes the Adjutant General's Department, and admission to it is gained by passing through the General Staff Academy. It is an independent corps under the direction of the Chief of the Head Quarter Staff. Its personnel is, 144 Generals, 242 Field Officers, and 109 other officers. Out of this number 47 Generals are employed on special service as also five Field Officers. In the Topographical Corps there are two General and eleven Field Officers, the remainder of the Officers being distributed among the various staff appointments with a reserve of unemployed officers to fill vacancies.

The Topographical Corps is employed under the orders of the Head Quarter Staff in making surveys and preparing maps.

The personnel consists of officers conducting the geometrical and topographical sections of the department, of a number of so called "topographers" for the mechanical work, and of a limited number of non-commissioned officers and pupils, viz :—

- 4 Generals.
- 15 Field Officers.
- 88 Regimental Officers.
- 84 Topographical Officials.
- 66 Do. Non-Commissioned Officers.
- 25 Do. Pupils.
- 107 Officers' servants.

Total 107 Officers, 84 officials, 198 men.

The Courier Corps consists of experienced, trustworthy and intelligent officers and non-commissioned officers, who are employed as couriers in carrying important despatches, and in performing orderly duties at Court.

No detailed information is given of the composition of the Scientific Military Committee, and the Military Topographical Institute, nor of their exact duties, the general nature of which can be guessed from their names.

The Nicholas General Staff Academy corresponds very nearly to the English Staff College. Merit, however, is recognised among the most successful officers below the rank of Major, by one step of promotion; the Majors, if successful, receive one year's pay instead.

The Military Schoolmaster's Seminary admits 75 pupils. Its object is to provide schoolmasters for the elementary military schools.

The Military Drawing School at St. Petersburg contains 200 students, who are educated in topography and drawing, and at the end of their tuition are appointed as topographers, conductors, or second class clerks.

The Elementary Military School at Tiflis educates 500 pupils for draughtsmen, engravers, clerks, gymnastic and fencing masters, for the topographical department and the Army of the Caucasus.

The Topographical School at St. Petersburg contains 40 pupils, who are educated for two years. Intelligent non-commissioned officers of the topographical corps, besides young Civilians, are trained at this school for officer topographers and officials; those who pass an "excellent" examination being appointed Sub-Lieutenants, the "very good" and the "good" certificate-holders are appointed ensigns and officials of the 12th class in the Topographical Corps respectively."

To show the result of these various educational establishments, and how they affect the general intelligence of the Army, the following extract from a paper published in the Journal of the United Service Institution, on the Russian Army, by Lieutenant C. Vincent, is given, and as it imparts, from a separate source, information on the Regimental School system of the Russian Army, which is not mentioned in the "armed strength of Russia," from which the above extracts are taken, it will give an idea as to the result of the education in the elementary and higher military schools which have been referred to.

"Nearly every day, from November to March, for four or five hours, the officers do the duty of school masters, and the captain or subaltern officer under his direction takes the greatest interest in the relative progress of his men. Periodical examinations take place, when a small prize in money or the favorite spirit (vodka), or the accordence of some special privilege, is sufficient to excite the greatest emulation. The teaching comprises arithmetic, reading, writing, and simple lectures on military art, illustrated on a black board.

" In every regiment of Cavalry or Infantry, or Battery of Horse Artillery, there exists a non-commissioned officers' school, conducted by two or three officers entirely told off for the purpose. Those men who are of good appearance and character after two years' service, who can read, write, and sum, are eligible to enter the school if they have obtained the grade of Lance Corporal. Going through the school, however creditably, does not ensure promotion to the non-commissioned ranks, it only entitles to it; skill in arms, tact in command, physical aptitude are necessary qualifications, for the first graduate. The course of study lasts two years; during the first the more elementary subjects of education are attended to, such as History, Geography, Arithmetic, Composition, and in the Cavalry and Artillery, Elementary Veterinary Surgery, &c.; whereas, in the second year the studies are more military, and include Military History, Field Fortification, Tactics and also Mathematics. You may smile at the word " Mathematics," but you must remember the Russian Army is the school of the country, hence the necessity of giving a sound general education, and you would have been no less astonished than I was, to see a pupil, selected apparently indiscriminately by the General accompanying me, and ordered to bisect a straight line according to Euclid on the black board. You would have been astonished too, on entering a regimental lecture room, to find the men listening to a lecture on tactics, and to see a relief model of the environs, and on inquiring its purpose, for the General to order two pupils to stand out, to hear him give them an extended operation to work, the one to advance with such an object against the other defending; to see painted tin models of companies and battalions at once worked, and when the General stopped the really sham fight, to hear each of the men in turn give a succinct account of his movements, dispositions and intentions, corrected now and again by his officers, but never assisted; to see another stand out and make his dispositions for throwing an advanced guard across the Vistula, describing them the while. Nor would your astonishment lessen, when a fourth pupil described the general geographical features of England, enumerated our chief towns, traced the course of our rivers; when a fifth starting from London followed the track of a ship to St. Petersburg, naming the countries their several capitals and sovereigns, by which he passed; when a sixth, starting from some far distant spot in Russia, traced the course by canals to St. Petersburg, enumerating the principal places on the route and their capabilities for billeting troops.

You may think, gentlemen, that I am exaggerating, but you have, I am sure, but to steer eastward to have the opportunity of verifying my statements, met, as I know you will be, with the courtesy, hospitality and frankness, which distinguishes Russian Officers. Meanwhile accept my facts. The pupils may have been selected, but I have no reason for supposing them to have been so, as I am not referring to any particular regiment. In the summer, field fortification is taught out of doors, but in the winter, when all the earth is hidden by many feet of snow, a box about six feet by four, filled with sand, answers the purpose.

In one class-room, I saw this box, in it were various beautiful models of field works. I expressed a wish to see the pupils at work. In an instant the surface was as level as this table, and in twenty minutes with tiny wooden scoops, a cavalier and a sunken battery were thrown up, with revetments as firm and slopes as regular, as all the time and skill of an army of engineers could make them. A sufficiently good scholar may pass at once into the first class, and thus absolve himself of the school in one year. The pupils are entirely separated from the men, living, sleeping and eating apart, although they generally revert to their companies for the great annual manœuvres. You can easily imagine what a highly trained set of non-commissioned officers such a system must form.

A commission is within the reach of any non-commissioned officer who passes the necessary examinations ; if these examinations be passed and the commission not accepted, an annuity of about £15 is added to the pay during service."

The most noticeable point of the above extracts is, that in the Russian Army superior intelligence is cultivated in every rank, by an adequate system of rewards for passing good examinations, thus affording a stimulus to work which must react on the general intelligence of the army ; and where the majority of the officers are capable of giving instruction of the nature quoted by Lieutenant Vincent, and where the Non-commissioned Officers are capable of benefiting by it, there is but little doubt, but that the mass of the Officers and Non-Commissioned Officers are capable at once of carrying out any orders they may receive, in the way of furnishing intelligence to the Military Topographical Institution, without calling in the assistance of the Topographical corps. The educational establishments I have noted are those bearing more especially on the work of preparing officers for staff duties, but there are in addition 10 elementary military schools. The Finland cadet corps and the Imperial corps of pages, 14 cadet schools, the Michael Artillery War school, the Nicholas Engineer War school, the Technical and Pyrotechnical school, the Military Law school, the school for Dressers, the school for Riding Masters, the Medico Chirurgical academy. With all these educational means working up steadily from the youngest age of admission, it is not to be wondered at that the result of the examination of the Russian Non-Commissioned Officers in front of Lieutenant Vincent, should have caused him to be astonished. We, in our army, are not accustomed to any thing of the kind ; the lightly won position of Non-commissioned Officer is as lightly lost. To expect an English officer to correct mistakes on the part of tacticians playing at another form of Kriegs-spiel and to lecture on the subject, would be very far beyond the education of most regimental officers. In all these points we are very far behind, and the difficulty is to raise the standard of education ; it can be done, but the intelligent and industrious must be substantially rewarded.

THE AUSTRIAN INTELLIGENCE SYSTEM.*

" 1. The Imperial Military Cabinet.

2. The War Department, which is divided into 3 branches connected with the various necessary administrations for the Army, and is further subdivided into 15 Divisions, each of which deals with its own particular subject. The 2nd branch is called, the Military and Technical branch and is divided into three sections. In the first section are three of the 15 divisions, Nos. 2, 3 and 5. The 5th division has the charge of all matters relating to military operations; of the distribution and marching of troops; of the general training of the regimental schools; of the manœuvres; of the affairs of the General Staff; of Surveys; of the military geographical institute; of the topography of the empire; of the war archives; of the pioneer department; of military statistics; of fortifications and of all lines of communication.

The Chief of the staff is charged with the superintendence of the general staff, and of the scientific bureaux connected with it; of the pioneer department; of the war school; of the war archives, and of the military geographical institute.

The following scientific bureaux of the general staff and committees also form part of the War Department, viz :—

The bureau of Military Topography at home.

" " " " abroad.

" " Military history.

" " Railway, steam-boat, and telegraph service.

" " Collecting and classifying information regarding foreign armies.

The Technical and administrative military committee and a Sanitary committee are formed for the scientific treatment of Artillery and Engineer and of medical subjects respectively. In the 5th Division of the Military and Technical affairs the following officers are employed :—

1 Major-General or Colonel.

1 Colonel.

1 Lieutenant-Colonel or Major.

8 Captains and 1 Lieutenant.

1 Military official.

The General Staff.

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* Extracts from the armed strength of Austria.

chief authorities and departments in all operative and purely military matters connected with the command of the Army, both in peace and war. The duties in time of peace are carried out by officers of the general staff and attached officers, forming the general staff proper, and by a fixed number of officers of the auxiliary branch ; the personnel is distributed and employed at the discretion of the Chief of the staff.

The General Staff proper occupies itself with the operative purely military, military administrative and military scientific duties ; the auxiliary branch furnishes the officers to form the intelligence department of the chief commands and staffs in the field, and the personnel for the executive and office duties.

The fixed establishment is as follows :—

General Staff Proper.

- 2 General Officers.
- 16 Colonels.
- 21 Lieutenant-Colonels.
- 43 Majors.
- 121 Captains.
- 118 1st Lieutenants.

Auxiliary Branch.

- 12 Regimental officers borne on the strength of their regiments.
- 14 Regimental Officers borne on the General Army strength.

347 Total

Appointments to the General Staff are dependent on the following conditions :—

(A) First Lieutenants must have passed the final examination at the war school, or at the advanced Artillery or Engineer course, with the certificate of “ excellent,” or have passed the examination for promotion out of turn. They must be 25 years of age and have served actively with a corps or regiment for at least three years, and be in every way fitted for service on the staff. They are first practically tested in the Brigade and Division offices, afterwards in the General Staff bureaux ; as a rule also, before being finally appointed, they are required to serve a year’s probation in the Military Geographical institute.

(B) Captains are, as a rule, taken from officers who have already served on the staff as 1st Lieutenants, or who have passed the examination for the second category of promotion out of turn. If these classes do not furnish the requisite supply, Captains who have passed the examination for the first category of promotion out of turn may be taken,

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preference being given to those who have served in the military geographical institute.

(C) Majors are taken from officers who have served as Captains on the staff, or who have passed for the second category of promotion out of turn.

(D) Lieutenant-Colonels and Colonels are chosen from the most deserving of the field officers who have previously served on the staff.

The Officers of the General Staff proper are mounted in peace as well as in war.

The auxiliary branch of the general staff consists of officers borne on their regimental, or on the general army establishment, and of Non-commissioned Officers as clerks. The orderly officers for the intelligence service in war are taken, as a rule, from intelligent well mounted officers of the reserve, who are physically fitted for the duty, have good sight, and are quick, clear readers of maps. Returns showing the names of officers applying for these appointments, and whom they can recommend, are sent in periodically by regimental corps, and district recruiting commanders. If the Officers of reserve do not suffice to cover the requirement, officers on the active list may be selected, with the exception of Commanders of Companies, Squadrons, or Batteries. A certain number of officers of the auxiliary branch are employed in the bureau for collecting statistics of foreign armies, in the office of the war archives, and in the executive duties of other sub-departments, according to requirement. The officers of the auxiliary branch are only mounted in time of war.

FUNCTIONS IN TIME OF PEACE.

The functions of the general staff in time of peace embrace all matters connected with the organization, distribution, training, general military duties, armament and equipment of the army, all questions relating to the defence of the empire, the communications, roads, &c., from the military point of view, the provision of all maps and plans, co-operations with the personnel of the geographical institute in the military surveys and reconnaissances, and geodetical and astronomical surveys; indeed they extend over all matters of a military and scientific nature, connected with a preparation for a state of war, so far as such matters come within the province of the general staff in the field.

The functions are performed by—

(A) The several bureaux of the general staff under the supervision of the chief.

(B) The organs of the general staff attached to the military authorities and chief commands.

(C) Officers of the general staff employed on special duties.

A general officer is appointed chief of the Staff, and charged in addition to the general control of his department, with that of the pioneer regiment in military, technical and scientific matters, with the superior inspection of the war school, of the office of the war archives, and of the military geographical institute. All questions of importance affecting the personal matters of the officers of the general staff, namely, their appointment, distribution, return to duty, removal from the list, &c., as well as all business of a scientific nature, are discussed by the bureau chiefs sitting in conclave under the direction of the chief, and the proposals submitted by him to the War Minister.

The following offices, presided over by field officers of the general staff, are placed immediately under the chief of the staff.

1. The bureau for general direction, charged with all questions affecting the personnel and the superintendence of the interior service of the general staff, all purely technical and scientific matters connected with the pioneer regiment and with the correspondence of the chief with the Minister of War, the authorities of the war school, of the archives and the geographical institute.

2. The bureau for military description at home, occupied with correcting and preparing maps, &c., with the study of the military features of the country generally with a view to military operations, with framing projects for defence and with the preparation of march routes and books, showing positions, passages of rivers, &c.

3. The bureau for military description abroad, occupied with collecting similar information regarding foreign countries.

4. The bureau for railway, steam boat, postal and telegraph service, charged with collecting all information regarding the course, peculiarities and capabilities of all lines of railways, &c., both at home, and abroad, in view of military operations.

5. The bureau for military history, in which the relations of all Austrian campaigns and other historical memoirs are compiled from official sources.

6. The bureau for collecting statistics, &c., of foreign armies, with regard to organization, effective strength, and readiness for war, forming the intelligence department.

The distribution of the officers of the general staff proper, and of the personnel of the auxiliary branch in time of peace and in time of war, is shown in the accompanying tables.

Table I.

Distribution of the officers of the general staff, and of the attached officers on the peace establishment.

			Officers of the General Staff and attached Officers.					
			General Officers.	Colonels.	Lieutenant Colonels & Majors.	Captains.	1st Lieutenants.	Total.
Employed in the Bureau of the General Staff.	Chief of the General Staff	...	1	...	...	...	...	1
	Bureau for general direction	...	...	...	1	4	...	5
	„ Military description at home	...	...	1	1	3	1	6
	„ Military description abroad	...	...	1	1	3	1	6
	„ Railway, steam boat, postal and telegraph service	...	...	1	1	3	1	6
	Bureau for Military History	...	...	1	1	3	1	6
	„ Statistics of foreign armies	...	...	1	1	3	1	6
	Specially employed	...	...	1	1	4	1	7
	Presidential Bureau of the War Ministry	...	...	...	1	...	...	1
	5th Division of the War Ministry	...	...	2	1	8	...	11
7 General commands			...	7	7	22	...	36
9 Military commands			...	...	9	21	..	30
25 Division commands			...	...	25	25	25	75
87 Brigade commands			...	...	...	...	87	87

		Officers of the General Staff and attached Officers.					
		General Officers	Colonels.	Lieutenant Colonels & Majors.	Captains.	1st Lieutenants.	Total.
Director of Military Geographical Institute		1	...	...	...	...	1
Commandant of the War School ...		1	...	...	...	...	1
Professors at the War School ...		...	1	3	3	...	7
„ at the Central Cavalry course ... ..		...	...	2	1	...	3
„ at the Central Infantry course ... ..		...	...	2	...	...	2
„ at the Academies ... ..		...	...	...	2	...	2
In the Technical and Administrative Committee ... ..		...	...	2	1	...	3
Military Surveys ... ..		...	...	4	12	...	16
Triangulations ... ..		...	...	...	3	...	3
Total		3	16	63	121	118	321

Table II.

Distribution of the personnel of the Auxiliary branch of the General Staff in peace.

		On Regimental strength.		On Army strength.		Total.
		Captains.	1st Lieutenants.	Captains.	Clerks.	
Bureau for general directions ... ..	...	...	...	3	4	7
„ „ Military description { at home ... ..	...	...	...	2	2	4
„ „ „ { abroad ... ..	...	...	...	1	1	2
„ „ For Railway, steam boat, postal and telegraph service ... ..	...	...	...	2	1	3
Bureau for Military history ... ..	...	...	...	2	1	3
„ „ for statistics of foreign armies ... ..	...	...	...	4	1	5
Staff for Miscellaneous employment ... ..	...	4	8	...	...	12
Total ... ..	...	4	8	14	10	36

There are therefore employed in the various offices, which constitute the Intelligence Department of the Austrian Army, 43 Staff Officers of all grades, and 36 officers of the Auxiliary branch, making a total of 79 officers, not counting those employed in the staff of divisions of the Army, and in miscellaneous staff duties.

THE PRUSSIAN INTELLIGENCE SYSTEM.

The Prussian Army organization has reached such a degree of efficiency, that it would have been desirable, had it been possible, to quote its Intelligence system in detail.

Colonel Stoffel's Military Reports, which is the only available publication bearing on the subject, can hardly enter into much detail, when he informs us that in Prussia neither rule nor regulation exists as to the composition of the staff of the Army. General Von Moltke is the centre from which, in his capacity as Chief of the Staff, the Prussian Intelligence works. He is both the director and instructor of the staff of the Army, selecting the most promising officers who have passed through the War School, and if after a further examination they are found competent, employing them on the staff according to their capabilities.

The duration of the first period of Staff employ is about two years, after which Lieutenants rejoin the Army with the grade of Captain. If their services are further required on the staff, they are re-appointed, after two years army service, with the rank of Major, but before promotion to Lieutenant-Colonel on the staff, a Major has to perform one year's duty in command of a regiment. The prize held out to officers to qualify for the staff is the rapid promotion to the rank of Major, which is attained about 8 years earlier than it could be regimentally. The Head Quarter Staff at Berlin is perfectly organized for instructing officers. There is collected everything requisite for the study of European armies and the countries which may become the theatre of war. All the Military books, newspapers, pamphlets, publications, maps, and plans which appear in Europe, are there collected and classified.

In nearly every report, Colonel Stoffel alludes to the moral superiority of the Prussian soldier of every grade resulting from his superior education and instruction, and more especially does he dwell on the superiority of the Prussian staff, of whose intelligence, energy and activity he bids the French War Minister to beware. The educational establishments to produce these results are as follows :—

At Berlin.

War Academy.

School of Artillery and Engineers.

Central School of Gymnastics.

School of Gunnery.

Laboratory School.

Medical and Surgical Institute.

Veterinary School.

Instructional Forge.

Hanover.—Cavalry School.

Spandau.—School of Musketry.

Potsdam.—Instructional Battalion.

Seven War schools. Seven cadet houses.

Five Non-commissioned Officers' schools.

Three Military Orphanages.

One School of Military Telegraphy.

One Railway School.

One Special school for Artillery Non-commissioned Officers.

Every inducement is held out to make officers study, and in most garrison towns, there are Military Societies where the officers meet for lectures ; at Berlin, the Emperor and Princes belong to the Military Society and visit it frequently. The influence of the Emperor in all military matters is immense, he is the Chief of the army, and in addition to continual inspections, parades and reviews, he devotes several hours daily, either to the Chief of the Military Council or to the War Minister.

There is, in the plain and unvarnished outline of facts collected in the preceding pages, much to afford food for reflection on many points unconnected with the Intelligence Department ; but there are two points which seem to come prominently forward as having a distinct, yet traceable, influence on the respective systems of Russia, Austria and Prussia. The first of these points is, that in these countries, the actual head of the Government takes also the leading place in the Military Hierarchy. The Emperors of these countries preside over the War Cabinets. With men of military instincts and education, such a position naturally leads to their personal views being transmitted through every branch of the Head Quarter offices, and notably those which supply them with facts and intelligence. Such an intimate connection between the ruler and his agents, cannot but succeed in raising the standard of energy and zeal, in acquiring and recording intelligence in time of peace, for use in war.

In India we have had an instance of it on a smaller scale, during the time that Lord Hardinge was Governor-General : in this case, previous

to the declaration of hostilities in the Punjab campaign, it was owing to his prudence and foresight, that we were found prepared ; but Lord Hardinge was a soldier as well as an administrator and his combining in a measure, without being an Autocrat, both the military and the political administration of the country, led to the production of Intelligence Officers, of the right stamp, when required, to assist him.

It will be but seldom that the Viceroyalty of India will pass into the hands of a real soldier, so that to maintain an Intelligence Department in the highest degree of efficiency, it follows from what has been said that the Commander-in-Chief, who would occupy the first place in our War Cabinet, if we had one, must be in intimate relations with the Civil and Political Government, and acquainted with all that passes behind the scenes.

The second point which comes "en evidence," is the importance that is attached in Russia to the War Schools and military education generally, requiring a separate direction of management to supervise it ; and the fact that in Austria, the supervision of the army schools belongs to the same branch as the real Intelligence Department ; while in Prussia, the Chief of the Intelligence is the instructor of the Staff.

We have our Council of Military Education in England, and our trained army schoolmasters under a Superintendent in this country, by whose means much good is done in educating our soldiers. There is, however, a want of vitality in the system, owing, it may be, to its being too disconnected with the army, and this will never be got over till there are greater inducements, both for officers and men to qualify themselves and stay in the service, rather than to hold out the temptation to all ranks to leave the army as soon as they have educated themselves sufficiently to pass any required examination for civil employment, or other more remunerative work than can be found in the Army.

In the Russian Army there are prizes, ranging from an extra glass of spirits for the private soldier, to one year's pay to a successful Major, adapted to every rank and grade ; but we cannot boast of any system of the kind, and the result is that our military education is defective.

Every modern military writer has insisted on the advantage to be gained by an educated force in the field, and the superiority of the Prussian Army is pointed out as being due to the fact, that most of the privates were as well educated as their officers. In the history of the Civil War in America by the Count of Paris, he assigns as a cause for their defeat that the Confederate soldier was inferior in intelligence and education to the Northern one. He says, "that this difference had a great influence on the result of the contest, for those nations are only really strong, where the moral and intellectual level of the greatest number, is as high as it can possibly be."

It behoves us, therefore, to raise our level in the army, both as regards education and morality, so that, not only shall we be unsurpassed

in these respects by others, but that our army may, in its rise, raise the standard of the nation in a corresponding degree.

Remarks on the Intelligence system of Napoleon the 1st, extracted from L'Art de la Guerre by Rossel.

In the present condition of the French Army, it is impossible, owing to the recent changes in its organization, to attempt any account of the Head Quarter Staff offices and their arrangements for collecting information; the following extracts, taken from a comparatively recent work,* however, may serve to give an idea as to the points which are likely to receive attention.

It will be observed that all the extracts taken from a chapter on Geography in this work, are merely copied from the orders and correspondence of Napoleon the 1st, whose authority in military matters still reigns supreme in France, and to whose writings, naturally, a great weight is assigned. They contain so much practical information, that even if they do not assist one towards learning what the French system of gaining intelligence is, they are, assuredly, not out of place in a work like the present.

“A Staff Officer will start at dawn for Auger. He will take notes twice or thrice a day, so as to miss nothing. He will mark down the villages he passes, the number of houses, population, and the places where the troops are. In returning by the road to Brünn, he will make the same inquiries into the state of the troops, diseases, &c.”

“When I ask for a reconnaissance, I do not want the plan of a campaign to be given me. The word enemy ought not to be pronounced by an Engineer. His duty is to reconnoitre roads, their nature, slopes, height, gorges and obstacles, to ascertain if they are practicable for carriages, and to abstain altogether from plans of field operations.”

“The Engineer has not shown all the villages; there is no record of the population inscribed.”

“Every evening a report will be made me on the work of each Engineer. They will study the country well. By this means there will be at the staff Head Quarters, instructed officers who will be more useful than guides. It is thus that the former Geographical Engineers of armies used to work, and it is by following their example, that Geographical Engineers will acquire esteem and consideration.”

“When the Army marches, the Geographical Engineers, who have reconnoitred the country, will always be at head-quarters in order to give the necessary information. Their reports will always be made in the most simple style of pure description. They will never wander from their subject to express ideas foreign to it. The length and

*Abrégé de l'Art de la Guerre, by L. N. Rossel, Captain of Engineers, who was imprisoned and afterwards executed for having taken part in the Communistic revolution of 1871, in France.

breadth of roads, and their qualities, will be given ; the windings of the roads will be correctly drawn, as often they can only be accounted for by the inequalities and irregularities of the soil. Rivers, too, must be traced and measured with care, bridges and fords marked. The number of houses, and of inhabitants of towns and villages, must also be shown as much as possible ; the contouring of hills and mountains will be given, in order that the highest points may easily be judged. These contours need only be in relation to each other. The way in which a thing is, impressed on the eye of an observer, should always be expressed in the most simple manner. There will always be one common scale for all drawings.”—*Napoleon Correspondence*.

This scale was one of three lines* for 100 fathoms, or one in 28,800 or thus falling between 25,000 and 30,000.

“The Geographical Engineers, although attached to the different corps d’armée, will not belong to them, but will receive their orders direct from either you or myself, for plans that are made after marches or battles are of no use. The essential thing is to have a good sketch as soon as the first skirmishers appear on the enemy’s country, that from these sketches, the Emperor can make his dispositions, either for a battle or any other design.” Napoleon, by his Major General, quoted by Mathieu Dumas. “I order that the map of Germany, which has been made at the War Office be returned there. It is so bad that I can make no use of it. I prefe, in its place, the first map that could be found at a bookseller’s. The mixture of good and bad portions is, unfortunately, worse in fact than if the whole were bad, for these are only likely to mislead in important operations. As regards maps, they must be good, or the doubtful and bad portions should be painted over in colour, so that it could be seen that they were not to be trusted. I am, moreover, not pleased with the one you have given me for the four departments of the Rhine, I want them done on the Cassini scale, and I laugh at your decimal divisions.”—*Nap. Correspondence*, 16075.

These extracts, apparently, have been selected by Captain Rossel to show the system on which the Emperor Napoleon worked his Geographical Engineers. It will be observed, that they were kept distinct from all military detail, as when information is required on military subjects a staff officer is sent, and in the several extracts given, the necessity for their confining their attention to their own duties is particularly insisted on.

It seems, however, that the system ordered by Napoleon’s Major General, of these Engineers being only responsible to himself or the Emperor, is so far objectionable, that the Commanders, with whom they were serving, would have lost the benefit of their observations, which would be reported only to the Executive Head.

* A “line” is a very nearly obsolete measure, if not quite so, now that the decimal system of measures obtains in France. The old French inch = 12 lines = 144 points.

The want of a direct chain of information, from the outposts to the central governing authority, told disastrously in the campaign of 1866 in Austria, as has been shown.

CHAPTER V.

INTELLIGENCE DURING WAR.

As regards the existing systems of gaining intelligence in peace, in other countries, it has been only possible to give a mere outline of the probable working of their Intelligence offices, and, as regards intelligence during war, even this amount of information is not forthcoming, with the exception of the regular system of procuring information by means of Cavalry reconnaissances. The secret department of the Intelligence is in all cases kept carefully dark, and naturally so. Luckily, our great master in war, Wellington, has left on record the system he employed in gaining information in India, and as this system is equally applicable to the present day, his memorandum is copied out. However willing he may have been to impart his system in India, by leaving it on record, in his subsequent operations in the Peninsular Wars, one looks in vain for any similar assistance, and though we find special officers with special salaries, detailed for Intelligence duties, yet there is no mention of any regular system.

“Memorandum on the system adopted for regulating the Intelligence Department in the Army, under the command of Major General the Hon'ble A. Wellesley.”—Wellington Despatches Vol. III.

Fort William, November 1804.

“One of the great difficulties of war in this country, is to obtain intelligence of the enemy's movements and intentions, sufficiently early to take advantage of them. The following modes of procuring intelligence were adopted in the late campaign in the Deccan, and were generally successful.

1. Three distinct departments for intelligence were formed in Camp, the heads of which communicated directly with Major General Wellesley. To each department were attached such a number of Intelligence hircarrahs, as rendered it certain that one would come into each department, from the enemy's camp, on every day.

2. The heads of the intelligence departments reported, immediately on its arrival, the intelligence received, and questioned the hircarrah particularly regarding the hour at which he had quitted the Camp. His intelligence was then compared with that brought in by the other hircarrahs, as received from other quarters, and a tolerably accurate opinion was generally formed of the facts reported.

3. Great care was taken that the persons employed in one department should not be known to those employed in the others, and that they should not communicate. The hircarrahs were highly rewarded, besides receiving monthly pay, particularly when they brought any intelligence on which an operation could be founded ; and were punished and turned out of the service, when they brought any which was known to be false.

4. The intelligence departments were kept, one by the Deputy Adjutant General, one by Mr. Elphinstone, who acted as Persian Interpreter, and one by Govind Rao, a servant of the Rajah of Mysore, who was used in the communications with the Native Sirdars.

5. Besides these departments for intelligence, a constant communication was kept up, and encouraged, with the native vakeels. They came every evening to Major General Wellesley : he communicated with them personally, and learnt all that they had heard during the day.

6. A correspondence was kept up with the amildars of the country, and measures were taken constantly, by means of the Mysore Sirdars and horsemen, and their communications with the heads of villages, &c. in the neighbourhood of camp, to find out the reports of the country, and everything which could throw light on the enemy's designs."

(Sd.) "ARTHUR WELLESLEY."

A similar system to the above could always be carried out in the field, especially if a campaign were undertaken again in India. The head quarters would have one set of spies, the Quarter Master General another, while the third set would be looked after by the most competent person who was not likely to attract attention.

When the column left Umballa to march down to the siege of Delhi, Hodson was appointed Intelligence Officer to the force, and told to raise one hundred mounted men. Such an appointment does not seem advisable, as it is too public ; in this case these mounted men became the nucleus of a cavalry regiment which bore Hodson's name, and the Intelligence department became merged into an irregular cavalry regiment, where it was less likely to attract special notice. The duties of the Intelligence and of the cavalry in war are so much the same, that it becomes difficult at times to separate them. The Duke of Wellington, in the Peninsular War, refused to allow the claim of an officer for special allowances for procuring intelligence, on the ground that he had only performed his duty as a cavalry officer.

It becomes necessary, therefore, to consider what are the special duties of the cavalry in war. The following extract from a practical work on the subject with a few slight alterations, adapting the tables of information to Indian requirements, will prove of great assistance :

La Cavalerie et son Armement depuis la guerre de 1870, par le Baron de Labure.

"The intelligence gathered during peace, to be made use of during war, is liable to such continual alterations, that it cannot be entirely depended on without further researches, to be made either during the period immediately preceding war, or during which the war is carried on. Such researches are called reconnaissances, and, as a rule, are undertaken by Staff Officers. Without well made reconnaissances an army has no security in its movements, and its chief can only direct his columns in a hesitating way, liable to constant attack and surprises. The Staff officers are not sufficiently numerous in an army to undertake the whole of the duty of continually gaining information, and consequently it devolves upon the covering body of cavalry, which is in front, and on the flanks of the force which it has to protect, to assist in this duty, for which service it is particularly well fitted. Thus there is in the field a close relation between the reconnaissances made by staff officers and those of the cavalry, the staff officers having both to direct the labours of the cavalry, while working themselves with the advanced patrols.

All the reports of the cavalry officers should be collected daily by the Staff of the General who commands the screen of cavalry, so that he should be made acquainted with what is going on, and by him be forwarded to the head-quarter staff of the Army, in order that the General Commanding-in-Chief should be able to direct his columns in safety.

The reconnaissance of the staff officers include, not only their work in war time, but also their labours during peace, which consist, as has been shown, in the preparation of maps with the continual necessary corrections, the Military and Statistical information, required for every country, so that on a declaration of war, all the data are available for its prosecution. The duties of the Cavalry are, during peace time, confined to preparing itself for its work in the field, when it has to carry on reconnaissances.

This duty can be divided into two distinct classes.

1st. The reconnaissances which take place away from the enemy, and are limited to the examination of local and topographical questions. These are called reconnaissances.

2nd. Those which have the enemy directly as an objective point, and whose object is to define his strength, position and intentions. These may be termed "discoveries."

As long as the covering cavalry is not in the neighbourhood of the enemy's scouts, it confines itself to the first class, but once it is in presence of the enemy, its observations are directed to both duties.

Every officer should have a map of the country in which he is operating. He keeps it up himself, both as regards surveying, levelling and movement of troops.

In addition, every officer should be furnished with a pocket book, in the shape of a drawing book, about 9 inches long by $4\frac{1}{2}$ wide, containing about 200 pages, the last forty pages are printed forms, as hereafter given. The binding of this book contains two pockets for gummed envelopes, and a place for a pencil and pocket knife. Each leaf is pierced, at two inches from the binding, like a postage stamp, to enable it to be torn off readily.

The first page contains the name of the Army, the number of the corps d'armée, the name, rank and regiment of the officer.

The remaining pages are in the following form :—

2"	Regiment.
----	-----------

It is preferable that the paper should be ruled in squares of a quarter of an inch.

This form would be used in reporting reconnaissances and discoveries, and for a field sketch. If one page is not sufficient, two or more can be used ; when filled in, the report is placed in an envelope, and sent by an orderly to the nearest chief authority. On the fly leaf the place and hour of despatch is entered, with a memo of the report.

The Officers of the Staff, Colonels and Generals of the protecting force, would use larger forms than the above, as they have to send in more detailed reports embracing a series of reconnaissances.

Reconnaissances are intended to complete the map of the country, in those parts where it is necessary to have detailed information. In order that it should be well carried out, the reconnaissance must be clearly ordered for a given object.

A loosely worded order, to make a reconnaissance along such a road, would produce a diffuse and useless report, while a specific order to reconnoitre a wood, a ford, or a railway station, would result in practical information being sent in.

Where an officer, on protecting duty, receives no special orders, he should proceed to make both reconnaissances and discoveries, and to send in to his chief, a report on all the places which in his map are

not detailed sufficiently, as also to fill in the printed forms which follow, as the particulars present themselves to his notice.

When an important fact comes under his notice, he reports that it would be most advisable that a staff officer should come personally to the place, and he gives his reasons for the request. As regards discoveries, he proceeds as above, and gets information regarding the enemy.

The various points on which he has to report, are those given in the next chapter under the duties of the Quarter Master General's department; as regards the towns, villages, etc., the information there-of required would be more conveniently given in the following forms, twenty of each of which are printed at the end of his note book.

Form for information regarding quarters.

Names of	{ Province. Military authority. Civil authority. Town or village.
	Population,
No. of men that can be lodged in	{ 1st Class Quarters. 2nd " 3rd "
No. of horses that can be stabled in	{ 1st Class Quarters. 2nd " 3rd "
Is there a building suitable for the head quarter staff or for a hospital ?	
Is there ground suitable for a cavalry bivouac ?	
Is there ground suitable for the Artillery Park, or for a Field Battery ?	
Observations :—Quality and proximity of water.	
Whether fortified by nature or art ?	
1st Class quarters can be taken up when not in the neighbourhood of the enemy ; the troops should be lodged so as not to interfere with the population, all the horses should be under cover.	
2nd Class quarters provide only shelter for the men and officers' horses.	
3rd Class quarters provide shelter for the staff, men and horses to bivouac or camp.	

Table of Military Statistical information.

Province.

District or Division.

Civil Authorities.

Town or village.

Buildings suitable for Army purposes.

Population.

Is there a Railway station ? Which is the nearest one ? Ditto for telegraphs.

Is there a Railway junction, if so, of how many and what lines ?

Can the station be made use of for despatch of troops ?

High roads ; intersection, and direction.

Building suitable for a hospital.

Local Resources.

{ Bakers.
Blacksmiths.
Shoemakers, Tailors.

Lakes, ponds, springs, wells, in the place and neighbourhood.

Navigable waters or canals.

Streams not navigable.

Ordinary price of day labor.

Mills.

Manufactories, specify nature.

Resources in

{ Oxen.
Draft bullock and carts.
Pack.
Camels.
Mules.
Asses.
Horses,
Elephants.

Approximate extent of township.

Nature of its soil, woods, rocks, fields, cultivable lands.

Richness of the place as regards forced contributions, fines, &c.

Fortune and names of leading men.

Climate, healthiness.

Quality of drinking water.

Observations.*

As regards fortifications, cavalry officers ought to note them, but it is the duty of the staff officers to reconnoître them, as also military positions, either for offensive or defensive purposes.

In countries of which there is no map or route, the routes are made out as the force advances, the investigations being carried as far as possible on the flanks, and if there is more than one column in the field, in the end a very good idea of the country is gained."

"*Discoveries*—The protecting cavalry, when it approaches the enemy, is more than ever furrowed by the officers of the staff; on the eve of an engagement when the screen is folded up, the army being only protected by ordinary outposts, reconnaissances ought to have ceased, for they should have been completed; the last discoveries which precede the fight are then made by the staff officers of the head-quarters, or corps or divisions, with the assistance of the officers of the divisional cavalry. The service of discoveries is one of the most important and dangerous in war. It requires a ready glance, a trained spirit of observation, great activity, coolness and intrepidity.

All reports regarding discoveries as well as for reconnaissances should be short and positive.

The following subjects ought to be kept in mind in making discoveries :—

1. To be certain that the advanced patrols are marching correctly in the direction indicated by the staff officers.
2. To prevent the screen being pierced by the enemy's cavalry, and to warn the supports should this ever happen.
3. The judicious selection of positions for outposts.
4. To discover the position of the protecting cavalry of the enemy.
5. To discover the position of his outposts. To count the camp fires.
6. To examine the roads which lead towards the first line of the enemy, to ascertain if they are occupied, and how.

* Sir Garnet Wolseley recommends the adoption of a series of questions printed in the language of the country, copies of which are to be carried by officers making reconnaissances, and given to postmasters or headmen of a village who are to write down the answers.—*Soldier's Pocket Book*, page 194.

7. The aspect of the country and the soil in the enemy's position.
8. Extent of sight, points where the view is intercepted.
9. To discover the dispositions for the engagement, and the march of the adversary.
10. To try and carry off all ventures that the enemy may make, whether discoveries, convoys, or spies. To intimidate the sharpshooters by some extreme measures. To act in surprises.
11. To ascertain the forces of the enemy and their composition, the name of the leader.
12. To provoke an alarm in the enemy's position.
13. To pay attention at the same time to the points which require to be reconnoitred, and to make them known to the staff, if time will not allow for their examination.
14. To note down the artificial and real defences of the enemy, and those which could be made.
15. The examination of the roads which join the net work of covering cavalry to the army.
16. To indicate generally, the extent of accommodation which exists in the country traversed by the protecting screen in front of the army, while approaching the enemy.

It happens sometimes that a discovery must take the form of an offensive movement, in order to obtain, in the interest of the army, some important result, with regard either to further operations or provisions. Under ordinary circumstances, the duty of the protecting cavalry is to get information, and not to fight, unless obliged.

In reconnaissances in war and especially in discoveries, the staff officers and those of the cavalry are sometimes obliged to fight, and even to provoke a skirmish. It is desirable that they should not, however, allow their temper to carry them away, as they ought to exercise the greatest tact, in all that might betray their intentions."

"Cavalry officers might learn, with advantage, to practise during peace what they would be called on to do in war, and the frequent use of the pocket book mentioned, with sketches of country, would be of more use than book learning, in accustoming them to judge facts, and things, and ground, and to report on them with clearness and precision.

The part that cavalry will play in future will be divided into two distinct branches; the first includes the independent action of cavalry corps, in what may be termed strategical operations; in the second branch would be placed the divisional cavalry,

who would play a tactical part on the actual field of battle, or in pursuits. Formerly, there was no necessity for the employment of independent cavalry corps. The tactical part was the principal one, and the strategical one was secondary : now it is the reverse.

Formerly, to precede, cover and protect armies, by facilitating and assuring their march, belonged only to the secondary operations of war ; now they form the principal part of a campaign."

Till this lesson is learnt by our light Cavalry in India, the formation of an Intelligence Department will not produce the good that it might otherwise do, for unless the designs of the General Commanding can be properly carried out, it is not much use for the Intelligence Department to furnish him with data on which to work.

CHAPTER VI.

The Quarter Master General's Department in India, and its relation to an Intelligence Department.

To create a new department, and to introduce it headlong into the middle of our present Army system, would be a greater trial than any department could stand. The Control Department which was organised at home is a case in point, where failure has more or less resulted from a too precipitate action. Too much was expected of this department, and consequently its failure created a corresponding impression. To establish a new department which would clash with existing ones, would be about the best means of defeating the object in view. Anything like intermeddling is particularly distasteful to a mind in consonance with departmental rules and regulations, and so to be able to float a new department, which particularly will be occupied in learning all about every thing, and thus come into collision with present systems and departments, is a matter which requires consideration. To make an independent department would tend to lead to the obstruction of public business, instead of furthering it, whereas to affiliate the Intelligence to a well known and established one would seem to be the best way of avoiding complications.

Now the department of all others with which the Intelligence has most affinity, is the Quarter-Master General's, which in itself is a smaller edition of the Intelligence, though this last would not, nor could it, replace the former in any way. In the field all the movements of the Army are ordered by the Quarter Master General, consequently his department rules supreme, and the Intelligence department must, therefore follow, with the rest of the army, this direction. At the Horse Guards, the head of the Intelligence department has been gazet-

ted with the rank of Deputy Adjutant General for Intelligence.* As far as words express ideas, this title would seem to mark a gap between the Intelligence and Quarter Master General's department, which should not exist, and a Deputy Quarter Master General for Intelligence would show at once the footing on which the Intelligence department would rest, and how it would be only a branch of the Quarter Master General's department. Thus our Intelligence department for India would come into existence carefully protected by the high name, which has been earned by the Quarter Master General's department, and in return it would raise this name still higher by supplementing the deficiencies which exist in it, by taking some share of its arduous duties, and thus affording the Quarter Master General's department more leisure for its own duties.

It will be necessary however to ascertain exactly what are the duties of the Quarter Master General's department.† By noticing where the weak points are, when the performance of the department is unequal to the expectations that are formed of it, we shall see at once where and when the Intelligence department can co-operate with it, to the mutual advantage of both, and the benefit of the Army.

The Quarter Master General's Department in India.

As the campaign of 1870-71 in Europe has had a revivifying influence on every branch of the military services, so we find that at the close of the campaign of 1815, a similar interest was roused in the condition of the Army in India. It is not wonderful that in the former days of slow communication, some delay occurred in the introduction and application of new and European ideas to the Indian Army, and so we discover the first record of the formation of the Q. M. G. department, in a general order of the 1st June 1817. This delay of about two years would not be thought, even in these days of quicker communication, very extraordinary, in bringing into existence a new department, but it shows that our ancestors were in earnest in the matter, as is evidenced by the opening paragraph of the general order:—

“The Right Honorable the Governor General in Council, deeply impressed with the benefits which, in a military and political point of view, the State is likely to derive from the services of a regular and well organised topographical staff, has observed with regret that the acknowledged advantages which the armies of European states have recently drawn from the modern improvements in this important branch of mili-

* It is a matter of satisfaction to the writer to find that the view he has advocated regarding the designation of the head of the Intelligence Department, has, since the above was written, been adopted at the Horse Guards, where the Deputy Adjutant General has been gazetted Deputy Quartermaster General for Intelligence.

† To avoid taking up space and also unnecessary writing, the Quarter Master General in this chapter, will be referred to as Q. M. G. and the other grades of the Department, by their initials.

tary science, have only been partially communicated to the army on this establishment.

"Para. 2. His Lordship has therefore resolved to establish, subject to the pleasure of the Court of Directors, a regular staff for the department of the Quarter Master General, the officers appointed to which, shall be permanently attached to this branch, after models prevailing in the armies of modern Europe and in the British forces in particular."

The number of officers then appointed was twelve, and it is curious to note, as showing the tendency to stagnation in military matters, which forms the chief part of the military history of the present century, that notwithstanding the large increase of territory which has fallen into our hands, since the formation of the department, that the number of the officers has only been increased by the appointment of the Deputy Quarter Master General.

The General Order proceeds to lay down that "Officers of the Quarter Master General's department, when their services may not be required with any division of the army, or for purposes of a more military nature, are to be employed, without any additional pay, on geographical or other surveys, as Land and River Surveyors and their assistants have hitherto done." With the paucity of officers in the department, it is not to be wondered at that this part of the order has become a dead letter, a survey of cantonment lands being the utmost surveying that is now expected, or that there is time and opportunity for, under the present arrangements. Moreover, the various surveys of the greater part of India, have been so satisfactorily done by the Survey department, that there is but little left for the Q. M. G. Department to do; it is not, therefore, so much the actual surveying that is now necessary, as the knowledge of the country at different seasons, that is required, which knowledge can only be gained by the slow and laborious process of a survey. How is it to be expected that any one officer should become acquainted with a division, like the Presidency District, which extends from Darjeeling to Hazareebagh east and west, and from Calcutta to Bhaugulpore, north and south, embracing every variety of feature of ground? The thing is impossible during a five year tenure of appointment; and even if the appointment of D. A. Q. M. G. of this district were a permanent one, as long as this officer is tied down to his office in Fort William, which he can only leave when accompanying a General officer on his inspections, he might be equally ignorant of his charge after having held it for twenty years. The General Order of the Governor General in Council above alluded to, was followed up in the same year, by a General Order of the Commander-in-Chief, specifying the exact duties of the officers of the Q. M. G. Department. As the duties then assigned are still those expected of the department, with hardly any alterations, an extract is given. These duties comprise :—

1st.—All orders affecting movements of troops.

2nd.—Allotments of military cantonments and Quarters, bivouacs, military positions, superintendence of embarkation and disembarkation of troops.

3rd.—Knowledge of the country in which the officer of the Q. M. G. department is stationed, as also of the neighbouring country, especially that portion which may become the theatre of military operations.

To enable the knowledge referred to in the last paragraph to be acquired, officers are directed to obtain, from the best informed natives, detailed information on the following points :—

1. The nature of the country and its productions.
2. If mountainous and hilly.
3. Whether high ground is connected in ridges, or in detached hills.
4. General direction of chains of hills.
5. What part of the hills are steep and rocky, and what easy of access.
6. The relative heights of their summits.
7. Subordinate ramifications of hills.
8. Origin of torrents and streams.
9. Mountain passes.
10. Ravines, water courses, and vallies.
11. Nature of soil, vegetation, &c.

“The most essential point, however, to which the preceding observations tend, is to get as perfect a knowledge as possible of all communications across the mountains or hilly parts of the country, whether they be roads, paths or cattle tracks, and of their nature, whether passable by wheeled carriages and artillery, or by men only ; also what are the points situated on them which may be most easily defensible, noting the possibility of turning the flanks of such positions by going to the right or left, out of the beaten track.” Further

12. If the country be level or undulating.
13. The nature of the soil.
14. The barren and cultivated portions, the nature and extent of the cultivation, so as to form an estimate of the supplies procurable, also water.
15. Forests and jungles, &c.
16. Course of rivers, canals, &c.

" In short, the nature of the country in reference to the operations of troops, viz., what parts are favorable for masses and what for dispersed troops. If the country abounds with enclosures their nature should be mentioned, &c.

Rivers.

17. Rivers, their source, length, difficult points of crossing, breadth, depth and banks, sudden rises and consequent inundations.

18. Means of crossing, whether by boats, bridges or fords, &c.

19. Favorable positions for bridges, &c.

20. Which bank is most defensible.

21. Facilities for movements of troops, number of boats available, boatmen, &c.

22. Careful and personal examination of fords.

23. Ditto nullahs.

24. Ditto marshes and paddy fields, whether passable when wet, and at what times they are dry.

Roads.

25. Roads, particular and minute information regarding breadth, nature of soil, &c.

26. Whether passable for carriages or infantry only.

27. Whether difficult or heavy after rain. Sloughs, materials required and where available, and the time required for a given number of men to repair a slough. If very extensive the best means of turning it.

28. Ravines and watercourses, information required as given under the above queries.

29. Roads through towns, if passable for the heaviest artillery ;

30. If impassable, the state of the roads outside the towns.

31. All roads and communications between towns to be known and examined, so as to enable separate columns to march. Also cross roads to enable junctions to be effected.

32. Ascents and descents, means of destroying the road.

33. Distance of places and noticeable points of the road, to be recorded in English miles.

34. Time required to travel, at either the ordinary walk of man or horse.

35. Names of towns and villages on or near the road to be given.

36. Villages of the same name in the same neighbourhood to be distinguished.

Cities, Towns and Villages.

37. Their size, population, supplies, means of carriage, particularly whether they are the residence of headmen of the Brinjaree and Rewari tribes, and the number of bullocks or camels which can be forthcoming in a given time, also rates of hire, &c.

38. The number of buildings or serais, which could be used as hospitals, magazines or barracks.

39. Whether fortified, or defended by nature or art.

40. General healthiness, whether affected by local causes.

Water.

41. Quantity and quality of water, and whether good or bad, the source of supply and depth of water below the surface.

42. If watered from a nullah, whether the current could be diverted by an enemy; if from a jheel or tank, what distance from the ground of encampment.

“ In India the importance of the water supply would govern the choice of ground to be occupied by the Army, and the greatest attention is to be paid to the subject.”

Forts.

43. Their situation, whether commanded or commanding; their gateways, defences, and roads leading up to them, should be noticed and a sketch made, if possible. Their ditches, depth and breadth, wet or dry, and nature of soil, if such to allow of their being deepened.

44. What they are intended to protect? if countermined? nature and situation of their magazines.

45. Garrison; of what description of men, numbers; and if followers of the chief in possession of the fort. The character, views and interests of the person in command of the fort.

46. Granaries, provisions, the sort and quantity in store.

47. Water, how supplied.

48. Artillery; number and calibre of the guns. Nature and proportion of ammunition, and source and means of its supply. How the guns are mounted and state of the carriages.

49. Bombproofs, if any, and where situated?

50. Profile of the works, mud, stone, or revetted?

51. Pettah;* general plans of the place and its defences.
52. Abbatis, how protected.
53. Retrenchments ; position, nature and extent, what cross ~~fire~~,
ditches fraised or palisadoed ; advanced posts for defence.
54. Stockades ; nature of situation, if defended by cross fire or otherwise.

Encampments and Positions.

55. All strong passes, posts and positions for a certain number of troops, which present themselves either upon the line of road, or in any other situation should be particularly described, either with a view of position or with reference to convenience on a march.

“ Officers of the Q. M. G. department should avail themselves of every opportunity to verify and extend their information upon the points above mentioned, and will note down in their Field Book, in an uniform and connected state, the information regarding routes, and in another book, “ Memoranda and References,” the nature of the country, population, resources, &c. stating in these reports what information is personally acquired or what has been derived, and whence, from others.”

Marches.

The general direction of marches of troops is another duty of the Q. M. G. and his assistants. In time of peace it will be sufficient to indicate to the officer commanding the station, whence a movement of troops is made, the number of the route in the Route Book, to regulate the march ; the same information being imparted to the Commissary General or Commissariat officer, so as to have carriage and supplies ready; but when the Army takes the field, the duties of the Q. M. G. and his department assume a greater importance.

An officer of the Q. M. G. department, attached to a body of troops, is at all times, but particularly in time of war, to be perfectly informed of the strength of the corps, and what detachments have been made from it, for what reasons and where. He is also to be informed in regard to the supply of troops with provisions and forage, whence obtained, and the amount of transport attached to the army or division, or ready available for its use, either for commissariat or other services. He will, without interfering with the regular course of obtaining camp equipage, see that the division is complete in this respect, and he will limit the proportion of personal baggage, servants, and followers, in time of war.

Previous to the commencement of active operations, he will ascertain, in conjunction with heads of departments, the number of cattle,

* The word “ Pettah ” is applied to the villages that have grown up under the protection of a fort ; such villages themselves are generally more or less fortified.

carts, doolies and bearers, and coolies, which may be wanted for the particular service of each department respectively, and which may, with advantage, be alternately employed with each department.

The duties of the officer of the Q. M. G. attached to a division, when troops are actually to undertake a march, may be comprised under the following heads :—

1. To ascertain, either by personal observation or enquiry, the safest and most convenient road leading to the proposed point, and its state of repair, in order to determine the number of pioneers and workmen which ought to march with the advanced guard, to clear away obstacles.
2. Pointing out the road to the column, either by leading it in person, or by placing trustworthy guides at its head.
3. When the division marches, it will be the duty of the officer of the Q. M. G. department attached to it, if not previously sent on, to see the column formed, and to take care that the several corps, artillery and baggage, are in their proper places with no unnecessary intervals.
4. He will in general be with the advanced guard, if not otherwise ordered, directing the removal of obstacles that can be cleared away by the pioneers at the head of the column, and ordering the temporary repair of the road.
5. He will, on the march, keep an attentive eye to the country right and left of the road, observe any paths that lead into it, that might enable an enterprising enemy to attack the flank of the column, and he will communicate his observations to the commanding officer.
6. He will allot quarters to the division in cantonments, and fix upon the ground for the camp or bivouac.
7. He will point out how the troops can enter the camp with the greatest ease, where wood and water are to be obtained, and what communications must be opened out in front flank and rear.
8. The guns and carriages of the artillery should be parked out of the way, but with easy access to the road, and the commissariat establishments of cattle and carriages, and the Field Hospital and doolies should be placed where they may occasion the least embarrassment.
9. It will depend upon circumstances, whether or not an A. Q. M. G. can precede the march, which on all ordinary occasions, however, he ought to do, long enough to enable him to complete all the arrangements above mentioned before the arrival of the troops in camp.
10. The A. Q. M. G. should lose no time in making himself acquainted with the neighbourhood of the cantonment or encampment, and he should, at the same time, make a tracing or sketch, showing the situation of the villages, roads, rivers, nullahs, woods, jungles, etc.

11. He will, receive the orders from the officer commanding the division, regarding the placing of outposts and pickets where they may be necessary, the instructions that are to be given to each, and the connection between them.

12. He will in concert with the officer of engineers, point out the most favorable situations for field works, abatis, or any other means of defence, and superintend their execution.

In addition to all the above orders and instructions, would be added others rendered necessary by the introduction of railroads and telegraphs. The importance of this subject of railways has lately been brought to notice in a circular from the Q. M. G., published together with a memorandum on the use of railroads in time of war, in the *Journal of the United Service Institution of India*, by Captain Collett of the Q. M. G. department, to which a reference should be made. As regards the purpose of this chapter, it will be sufficient to note, more curtly, the chief points on which a report on a railroad would touch.

Partly extracted from Lalmire's Aide Memoire of Reconnaissance for Cavalry Officers.

Termini, direction of line, soil, inclines, cuttings, embankments, if protected by hedges or wire fencing. Crossings of roads ; bridges. If defensible towns and villages in its neighbourhood. The number of lines of rails, gauge, railway telegraph, condition of the railway, whether in good order or interrupted. The places where it could be broken, the defensive value of the stations, and the means by which an attack or defence can be best carried out. What is the relative importance of the stations and the available railway plant. Means of embarking and disembarking troops, with artillery and cavalry ; the available railway staff. Is the ground in the neighbourhood of stations, suitable for camps, and are there buildings that could be used as stores. The quantity and quality of water on the line at the various stations ; arrangements for cooking.

The D. A. Q. M. Gs of divisions have to master this subject in addition to the previous long detail, and it is evident, that as more use will be made of railways in future for military purposes, there will be a greater chance of the routes by road being forgotten and ignored.

The points regarding telegraph lines which have to be reported on are :—The terminal stations ; which are the nearest stations to the point whence the report is made. Can the telegraph line be made use of by means of an army in its neighbourhood ? How can it be damaged, and what are the available materials for repairs ? What are the receiving stations, and the number of telegraph officials, European or native, at each ?

The quantity of material available for construction of branch lines and the length of line that could be laid down at any given place, at a short notice. It being a matter of vital importance that the command-

er of an army should be in constant communication with his advanced troops, which may be distant several marches off, it is essential that the full capabilities of the telegraphs should be accurately known beforehand, and to what extent they can assist the field telegraph which accompanies the army.

It is evident from the perusal of the above duties of the Q. M. G. department, how very close the distinction is between them and the duties of the Intelligence. The Q. M. G. of a division or district has to obtain information on nearly every point, as regards his district and the neighbouring country, that is required by the Intelligence officer, with the exception of the historical and perhaps some of the statistical information; and on these points too, he might, if there were leisure to do so, procure the necessary information, so that as regards an Intelligence department we ought to be able to find one almost ready made in the Q. M. G. department: that we have not got one is evident from the proposal to establish an Intelligence department, for if the orders relative to the Q. M. G. department could be fully carried out, there could be no reason to introduce another department.

The operation of the five year tenure of appointment, and the continual changes of the D. A. Q. M. Gs from one end of India to the other, must prevent the acquisition of the special knowledge of the country that is contemplated in the General Order, as also the verification of previously gained information. When the whole time is taken up in questions relative to barracks, cantonments, transport by rail and road of troops and detached parties, there will not be any opportunity for the D. A. Q. M. G. to attend to the more important duties of making himself acquainted with his division or district, much less with the neighbouring country. There seems to be only one way of obviating this difficulty, and that is, for one or more assistants to be appointed to each division, whose sole duty it would be to make themselves acquainted with the country. When the appointment of D. A. Q. M. G. of a division became vacant from any cause, instead of transferring another D. A. Q. M. G. the assistant, or the senior assistant, in case of there being more than one, should be promoted at once to fill the vacancy, and another assistant appointed in his room. By this means, there would be a qualified officer ready to assist the general commanding, in all the questions that came under his charge, who could devote the whole of his time to the current duties of his office, without having to put them on one side to make himself acquainted, after appointment, with his division. The knowledge that should be required from a D. A. Q. M. G. would be to write a route across country between any two given places for a specified force, showing distances of the marches, obstacles that would be met with on the road, camping grounds, etc. Till this can be done correctly in the field, away from office records and maps, a Q. M. G. cannot be said to know his division thoroughly. If the present organisation of the Q. M. G. department is insufficient to carry out the departmental orders in time of peace, there is no doubt that it will fail very much more in time of war. One has only to per-

use the orders for the department as here given, to find that it is impossible for one man, however good and zealous he may be, to carry them out, as he cannot possibly be as ubiquitous as the orders require him to be. He has to precede the march if possible, and yet he ought to see the baggage properly formed up; and while his duty is with the advance guard to clear the road, he is to communicate his observations to the general commanding. Again, after having reached the camping ground, he has to make a tracing of the country round, as if an area of four or five square miles could be surveyed in an hour or so, and place the outposts and pickets, and superintend the defensive measures necessary. Such orders to be carried out, evidently require two men, one to look after the column, and the other after the country, and thus again the necessity of an Assistant to the D. A. Q. M. G. is shown; the D. A. Q. M. G. would by remaining with the column, be able to communicate his observations to the commanding officer, though of course there is no necessity for his continually remaining in attendance on him; but there would always be work for him on the exposed flank of a march, while his assistant preceded the column and cleared the road. In the Peninsular War, there was a body of men called the Royal Staff Corps, who were utilised by the Quarter Master General's Department in acting as guides to the various columns, and in keeping the baggage columns in order. This small corps was under its own officers, in a measure, for purposes of discipline, but the men generally were detached as required. At present, if a Q. M. G. wanted a guide, he would have to apply to the civil authorities. In our own territory, and in foreign lands, he would have to put some pressure upon the local authorities, till he got what was required, and if this were not feasible, he would have to lead himself; thus confining himself to only one portion of his many duties, one which could be as well devolved on others.

The Guide Corps was raised in India with a somewhat similar intention to that which caused the formation of the Royal Staff Corps of the Peninsula; it was thought by enlisting men from different parts of the country, it would be possible to make use of them as guides when required; but it is difficult to see how, with the exception of the immediate frontier in the valley of Peshawur, much good can have arisen from this regiment remaining perpetually quartered in a frontier out-post.

If the Guide Corps is to be of use on service, it should send detachments all over India or Bengal; it would be possible then for a Q. M. G. to find a soldier in his division, who could be of assistance to him as a guide. As a dismounted man is not much use for gaining quick information, there does not seem any necessity for sending out detachments from the Infantry portion of the Guide Corps, which could remain as it is, an Infantry regiment. Of late years, it has been thought advisable to educate the soldiers of this corps as regards surveying and re-connoitring, sending them to the college of Roorkee for instruction; the result has been most satisfactory and even surprising; but it

is evident, that unless this knowledge is kept up by continual practice, a great deal of it will be lost in time. The fort of Murdan, situated on an open plain without many land-marks, will not offer much opportunity of ground for surveying and reconnoitring, which must be sought for elsewhere. By attaching these trained soldiers to the different divisions and districts of the army, and placing them under the Q. M. G., he would be able to find them continuous work in reconnoitring. Another advantage that would result from this scheme, would be, that in course of time, a Q. M. G. would come to be acquainted with the character and abilities of these men, and would know to what degree he could employ them on service. Though there are but few occasions in India where a qualified native is not much better for acquiring information than a British soldier, yet it might, perhaps, be desirable to add a few English soldiers to the detachment of intelligencers under the Q. M. G.

During some part of the year, these intelligencers could be made use of as office clerks, though, to be thoroughly useful, they must have as well as the Q. M. Gs. and the detachment of the Guides, an equal knowledge of the resources of the district, &c. These men, selected from the ranks of non-commissioned officers of over eight years' service, would after passing through the Roorkee College with credit, be attached to the Q. M. G's Department. This appointment of intelligencer should be considered as a prize, and be rewarded accordingly. At present the educated soldier is rewarded, so to speak, for leaving the army, by entering any of the better paid semi-military departments. If the standard of military education is to be raised, there must be inducements for the best educated men to remain in the army, or in military employment. The further inducement for good conduct, while serving in the Q. M. G's Department, would be promotion to the commissioned ranks, after completing 12 years' service as an Intelligencer, or a liberal pension. No honorary rank or warrant grade should be held out as an inducement; if a man is a soldier, these nominal rewards will not be an incentive. In India, except in the large presidency towns, there is no society for men who have been promoted to warrant officers, except that of their previous comrades, it may be, in regiments; consequently the warrant grade is not thought more of than the non-commissioned one. It would, therefore, be desirable to let the European Intelligencers of the Q. M. G. Department rank as non-commissioned officers, and by removing them at the end of 12 years, so as to prevent the possibility of any old or effete men remaining in the department, with either a suitable pension or promotion to the commissioned ranks, there would be a stimulus to good behaviour, which is rather wanted in other departments, where promotion is stagnant from want of vacancies at the head of the lists, which are occupied by nearly useless old men. The curse of the British soldier is intemperance, and this is aggravated by removal from the restraint of a regiment to detached employment; but though it might be a difficult task to obtain the small number of Intelligencers required, from the ranks of the Cavalry and Mounted Artillery, yet it would be possible, out of an army of 40,000

men, to obtain some who had sufficient self-reliance and abilities to merit being kept on in the department; but even if through misconduct they were returned to their regiments, the army would gain by having one more educated soldier in the ranks. Both these men and the Guide detachments would be taught signalling, and practised at it continually; in the field they would be equipped as mounted Sappers, ready for any emergency, and be provided with gun cotton discs for demolition.

They must be men of good eyesight, light and active across country; in fact they must possess the same qualifications as their superior officers, and have passed an examination in the vernacular of the part of the country where they are to be employed, previous to their drawing full allowances. This is specially necessary, as the vernaculars of most parts of India are very different from the ordinary Oordoo or camp language, which prevails in the towns and barracks. Should any of these men be returned to their regiments as unsuitable for the work from any cause except misconduct, they would continue to draw staff allowance as a reward for having passed a difficult examination, which allowance would be forfeited on reduction to the ranks.

Though the local knowledge of officers of the Q. M. G. department, serving with divisions and districts, is not so great as it might be, there are generally two sources open to them from which they can acquire a fair knowledge of their charges. These are the Survey and Settlement reports. There are but few parts of India, where surveys have not been carried on, followed in course of time by settlement operations. Where these surveys have been conducted by military officers, as has been hitherto the case, their reports would contain a great deal of the necessary information required by the Intelligence. In the report of the survey of the Hazareebagh district, the military features of the country are touched upon, the natural and artificial strong places, the roads and communications across country, the resources of the district as regards the movements of a force are all detailed, making a valuable record for an Intelligence office; other survey reports would contain similar information, though every one might not be as complete as the one mentioned. To show how far the settlement department can co-operate with the Intelligence, the following summary of a settlement report is given. As the publication of this report has not yet been sanctioned, the name of the district and of the author is withheld.

The report is divided into three parts :—

First, Descriptive and Statistical.

Second, Historical.

Third, Settlement.

The following subjects are treated of in the first part; general aspect of the district, soil, fertility, water, water supply, natural drainage, prevalent diseases, vegetation, with details of trees and grasses, rivers, watershed, lakes, canals, ferries, roads, bridges, traffic, exports and

imports, carriage, bazaars and marts, fairs, manufactures, natural products, cultivation and produce in detail, irrigation; cattle, draught and milch; population, &c.

The Historical part gives the history of each pergunnah, as regards the towns and villages, tracing the rise and decay of the large proprietary families, and the battles they fought, in the acquisition and loss of their properties. The places of note are also given.

The third part treating of the Settlement, having no bearing on the Intelligence Department, is merely interesting in a general way.

From the above brief notice, it can easily be imagined, that anyone with a map could form a very good idea of the country without visiting it; but book learning can never equal practical knowledge as regards a country, so that, even with the assistance of survey and Settlement reports, the necessity of the Q. M. G. and his subordinates, to make themselves thoroughly acquainted with their district by personal examination, is not done away with, but the reports should be carefully studied, with a view to detecting errors.

The proposals made in the course of this chapter are here recapitulated. To each division there would be one D. A. Q. M. G. assisted by a Topographical Officer, who would be appointed for three years only, four European Intelligencers with rank of sergeant, rising to the grade of Staff sergeant after six years' departmental service and being pensioned after twelve years' service in it, if not promoted to the commissioned ranks. Eight non-commissioned officers and men of the Guide Cavalry, to be relieved every third year by another detachment of this regiment.

CHAP. VIII.

Organization of an Intelligence Department for India.

Having, as far as possible, examined the conditions necessary for the establishment of an Intelligence Department, the detail of its organization can now be considered.

The Deputy Quarter Master General for Intelligence would be an officer of the rank of Colonel or Major General; the first appointment made should be for ten years, and subsequent ones for five; the object of increasing the first tenure of the appointment being to enable the founder to work out his own system, and to see the result of his labours, which might not be the case if he were removed at the end of five years; the next incumbent, coming into a ready made department, might come under the operation of the five year rule of tenure, but its operation would depend on the fitness he displayed for the post; if capable, his re-appointment should be assured. The duties of the office would be to prepare, under the direction of the Quarter Master General, plans of campaigns, and to submit them, as well as reports of the condition of the various countries, where he had his subordinates at work,

to the Council of War in India, which would be composed of the Commander-in-Chief, the Adjutant General, the Quarter Master General, the Inspector General of Ordnance, the Commissary General, the Inspector General of Fortifications and the Military Secretary to Government. He would, as regards Intelligence, correspond directly with the Secretaries to Government, and he would have the power of submitting names of travellers, either civil or military, whom he might wish to employ, for the consideration of Government in the Military or Foreign Department. He would be assisted in the preparation of his reports by an officer of his department, with the title of Assistant to Deputy Quarter Master General of Intelligence, and who should be conversant with as many languages as possible, European and Asiatic. He would be in correspondence with the Royal Geographical Society at home, and the reports of other Geographical societies would be obtained, and translated by his assistant when necessary.

He would collect and forward to the Quarter Master General, all reports from the Divisional Quarter Masters General and Topographical Officers. He would keep up a list of officers, non-commissioned officers and men, European and Native, as also civil agents of all ranks, European, Eurasian and Native, who would be available for employment under his orders, with a report of their several qualifications and fitness for special employment. His office would be divided into three branches, Historical, Geographical and Statistical: each branch would be under the supervision of an Intelligence Officer, with the rank of Assistant Quarter Master General, who would be appointed at first for seven years and re-appointed if required. These officers should be conversant with one or more foreign languages.

The head of the Department would be allowed to purchase books, maps and plans as he might think necessary, either through the agency of a Government bookseller, or a certain specified advance could be made to his office, to enable him to purchase directly, submitting bills and vouchers to enable him to recover the money expended. Thus, in course of time, a valuable Military Library of reference would be formed. The duties of the Intelligence Officers at Head Quarters, would be to make a digest of every book submitted to them, each extracting the portions referring to his branch. Every means should be taken to procure as many works as possible on the same subject, and by comparison of their contents, to arrive at a satisfactory conclusion.

A lately published work on "the Russians in Central Asia," by Von Hillwald, shews the style of work that would result from these compilations. This work is a digest of many books, magazine and newspaper articles, carefully collated, and it treats of the history, geography and statistics of the various Central Asian countries, lately occupied by Russia; though there are errors in this work, it would be the province of the Intelligence Department to detect them, on perusal of the book and comparing it with other authorities. A point in this book deserves notice, and that is the connection between the Russian Geographical Society and the general Staff Corps, as regards the various combined

military and scientific expeditions undertaken in Central Asia. In addition to a general account, special and local reports would also be prepared for use. All military publications and newspapers, devoted specially to military intelligence, besides the leading journals and magazines of every country, would be taken in and perused, from which every fresh fact or opinion likely to benefit the department, would be excised and filed for reference.

The clerical duties of all the Intelligence officers would be conducted to the extent necessary by European Intelligencers, specially selected; but the fewer employ  s of any kind there are, the less chance there would be of information, which it was advisable to keep secret, being surreptitiously or accidentally divulged. The use of a cypher for confidential communications would of course be a *sine qua non*.

There should be a full and free interchange of information between the Intelligence office at the Horse Guards and the Intelligence office in India; beyond this, it is immaterial whether the same system of procuring and recording information is pursued by either office. As long as the information is gained, it does not signify how it is procured, so that even if it were possible to describe the Horse Guards system, in detail, not much good would result, as each department must work for itself and adapt its own means to its own ends.

As so much depends on the education of the Army in time of war, there would seem to be some fitness in subordinating, after the Austrian model, the head of the Garrison Instruction, as well as the Superintendent of Army Schools, to the head of the Intelligence Department, who would be able to give a more practical shape to both these schemes of instruction; this point is not insisted on, but it is believed that undoubted benefit would arise, as by means of both these sources of instruction, the names of the most promising and suitable officers and non-commissioned officers could be brought prominently to his notice, for employment when opportunity afforded; this would give a stimulus to the cause of military education which is much required.

The duties connected with Railways and Telegraphs are so important and annually increasing in importance, that it would be desirable to have a special office for their adequate supervision. This branch belongs, altogether, to the Quarter Master General's rather than to the Intelligence Department, but yet it has a sufficient connection with it to warrant its mention here.

As the Quarter Master General's Department has hitherto supplied the information connected with our own territories, there seems to be no object in making any change in these duties, except that all the reports of the Divisional Quarter Master General, should be submitted to the Intelligence Office, and thence forwarded to the Quarter Master General of the Army.

The duties of the Deputy Assistant Quarter Masters General of Divisions and Districts would be performed as heretofore, only their work

would be lightened, in a manner, by the appointment of these Assistants, or Topographical Officers, who would undertake all the duties, unconnected with troops or quarters, as regards cantonments, fortifications, and transport. The appointment of Topographical Officer would be the stepping stone to that of Divisional or District Quarter Master General, but in order to have a reserve of qualified officers available for each district or division, the tenure of these appointments would be for three years only ; thus during the incumbency of two Divisional Quarter Masters General, there would be three Topographical Officers. In some cases, the chances of the third officer ever attaining the higher post would be but slight, but in others, owing to deaths, retirements, or other causes, he would in his turn receive the promotion, if qualified in every respect. Thus in every command there would in time be one or more qualified officers, ready to take the duties of Divisional Quarter Master General, when necessary, either on the occasion of a temporary or a real vacancy.

It may be objected, that as the task of preparing a Gazetteer of India has been undertaken and carried out by the Quarter Master General's Office, there would be but little to learn as regards the country which was not already known ; the answer to this is, that it is not the book knowledge of the country that is required, but a practical knowledge, such as is possessed by the District Civil Officers, Surveyors and Settlement Officers. If the services of these officers could be obtained when required, there would be no necessity for Military Topographical Officers. An instance will prove this ; a battery of Royal Horse Artillery in a cholera camp, not very far from its station, was ordered to march to another camp, but a few miles distant on the map. The march occupied about twelve hours of a hot weather day, owing to there being no road, and the ground being cut up by ravines, which necessitated either detours or rough roads being made for the passage of the guns. The consequence was, that after the exposure to the debilitating effects of a hot weather sun, the attack of cholera which had disappeared at the previous camp, re-appeared and carried off several victims. Accidents like this would not happen, if the country were accurately known, which knowledge cannot be acquired from books, or maps, alone.

The duties of a Topographical Officer would be—

- 1st. To report on the regular camping grounds of the districts.
- 2nd. To report on the sites selected for cholera camps, and the roads in connection with them.
- 3rd. To make a reconnaissance on every road, path, or track in the district, once in the hot weather and once in the cold season.
- 4th. To report on the strategical positions, forts, and fortified places he may come across in his tours.

5th. To visit and report on every village or town in the district, as regards its importance in a military point of view.

6th. To make himself acquainted with the district vernacular, so as to undergo an examination in it after he has been one year in the district.

7th. To note down the names of individuals in the district, who might be qualified for special service.

8th. During the time he was not employed on any of the above duties, he would be capable of affording assistance to the Intelligence Department, either by making translations of foreign works, for which he must be master of one foreign language, or by making digests of works sent to him.

All the reports of the Topographical Officers would be sent through the Divisional Quarter Masters General, so that the present officers would learn, though by book only, somewhat more of their division than they now can; and if the future Divisional Quarter Masters General be selected only from the Topographical Officers who have served in the division, by perusing the reports of their successors they would be reminded of their own labours.

The appointment of Topographical Officers would, under the present Army system, be given alternately to officers of the British and Indian Armies; the former after passing the final examination of the Staff College, and the prescribed examination for the higher standard in native languages; and the latter, after undergoing any suitable examination requiring an equal degree of knowledge to the Staff College standard, and in both cases the officers selected would require to produce certificates as to bodily health, eyesight and riding capabilities. As vacancies occurred in the Head Quarter Intelligence Office, they would be filled up by selection from the Deputy Assistant Quarter Masters General.

Each reconnaissance would be made with two of the European Intelligencers and four of the Guide Corps men attached to the division, so that these men would have an equal chance of becoming acquainted with the district.

The European Intelligencers, when not employed in the district would be utilised in the office of the Topographical Officer as clerks, and would also be required to teach Army Signalling to the European troops. The native non-commissioned officers and men of the Guides, when unemployed, would also be available for the instruction of the native troops. Both grades would also be at the disposal of the Garrison Instructor at stations where there was no company of sappers, to assist in the construction of field works, bridges, &c., so as to keep up the practical knowledge they had learnt at Roorkee. The Intelligencers should be practically acquainted with the driving and repairs of locomotive engines, plate-laying and railway duties generally.

There would be a duty which might, as it belongs to no one in particular at present, be properly assigned to the Intelligence Department, and that would be, to watch the temper of the Indian population generally, and especially that of the Native Armies.

The causes which led to previous outbreaks and mutinies are still extant ; education has removed some of these causes, and is on the other hand doing somewhat for increasing others ; the difference of religion between the conquerors and the conquered will always, as long as it exists, afford a rallying cry in the hands of designing men, in order to raise the standard of sedition and revolt. A purely mercenary army is always liable to strikes in matters connected with pay and allowances ; and as strikes cannot be allowed in the army under any circumstances, it is always desirable that the just cause for grievance should be ascertained and remedial measures applied, before the time when concessions would, when made, be attributed to fear rather than to the desire of doing justice. It may be some time before the modern ideas of the western world, as regards more pay for less work, find their way to this country, but in proportion as education spreads over the country, European ideas must follow in its wake, and this particular one will commend itself with full force to the Asiatic mind. The word strike is used instead of the military term mutiny, as it expresses more clearly the nature of the outbreaks that have occurred at various times, owing to differences of opinion on the subject of pay and allowances in the Native Armies of India, previous to the mutiny of 1857.

As the Intelligence Department would have its subordinates at work in different parts of the country, and unconnected with either the civil or military administration of the Government, it would probably be in a position to sound the popular feeling of the country, in a more direct manner than could be done, either by civil officers working through the civil native agency, or commanding officers of regiments through their own native soldiers. Whatever means were employed, it would be the duty of the Intelligence Department to foresee, as far as possible, any complications that might arise from the cause above mentioned, or any others, which might tend to diminish the feeling of loyalty in the native army which now exists.

The Topographical Officers and European Intelligencers, as also the detachments of Guides, would naturally find their places and duties in war.

The Topographical Officers, being thoroughly educated in their duties, would not have to acquire them in the field at the expense of the army. Some would be promoted to the charge of divisions formed for active service, others would be employed as Topographical Officers in advance of the force ; and when the Cavalry, owing to neglected opportunities of acquiring the practice of reconnoitring, required assistance of any kind, the European Intelligencers and detachments of the Guide Corps would be of great assistance. The number of European officers with Native Cavalry regiments is too few, to allow of their being much

detached for reconnoitring purposes; the Native officers, as a rule, do not possess the necessary education, though they are capable of acquiring information; so that there would be many opportunities for the employment of the Intelligencers and Guides. When not thus employed, they could be used as orderlies, and thus save good men being withdrawn from regiments for this purpose; there would be sufficient clerical labour in the preparation of reports by the Topographical Officer, to allow of his making use of clerks to assist him, and the Intelligencers, having already worked in the office in time of peace, would be capable of giving him real help.

Some of the Guide Corps detachment might prove of equal use, as regards vernacular correspondence.

The varying features of a campaign are so great, that it would be impossible, as well as useless, to specify more exactly the duties and positions of the Topographical Officers in the field. The officer commanding the force would have a retained body of officers and men at his disposal, and he would give such orders for their employment as he thought necessary, according to the circumstances of the case. At present a force going into the field for active service, would be provided with Staff Officers, some of whom might be utterly ignorant of their duties; by the scheme proposed, such a case ought to be impossible, and would never occur as long as there was a Topographical Officer available.

Thus an attempt has been made to reconcile the difficulty of adequately preparing for war, as regards the Intelligence Department, during the time of peace. A department or branch of a department has been outlined, with duties sufficiently onerous and laborious, requiring officers and men of high capabilities to carry them out; doubtless in its working, some of the outlines would require alteration, but whether or no, it would seem that there are very necessary reasons why an Intelligence Department should be formed, and rather than delay till a perfect scheme without flaw were devised, it would be better to adopt a scheme with flaws, and remedy it by degrees.

The cost of the proposed department would be monthly, Rs. 30,000 as under:

Charge.	Number.	Intelligence Department.	MONTHLY.					Total.	REMARKS.
			Pay.	Allowances.	Staff Pay.	Total of Grades.			
						Rs.	Rs.		
REGULAR.	1	Depy. Qr. Mr. Genl. for Intelligence...	1,000	1,000			In addition to Staff Corps' Pay of Rank. Travelling allowance Rs. 5 a day when in Camp. Pay drawn with Regiment.
	1	Asst. to Depy. Qr. Mr. General	...	...	500	500		
	3	Asst. Qr. Mr. Genl. for Intelligence...	...	...	600	1,800		
	22	Topographical Officers	...	150	200	7,700			
	94	Intelligencers	60	60	30	14,300			
	176	Guides			
SPECIAL.						25,300		25,300	
	3	European Agents in foreign countries	600	1,800		Persia, Egypt or Arabia, China, Afghanistan, Beloochistan, Turkistan, Russian Asia, Nepal, Burmah, Swat. To be allowed to accumulate to the credit of the Department.
	7	Native Agents in Asiatic Countries...	200	...	...	...	1,400	
		Special Service money	...	1,000	...	...	1,000	4,200
MISCELLANEOUS.									Including menial servants.
		Office House rent, &c.	...	200	...	...	200	
		Books, Periodicals, &c.	...	200	...	...	200	
		Stationery	...	100	...	...	109	500
							Rupees	30,000	

There are eleven divisions or districts in the Bengal Presidency, and eleven in the two others, thus giving twenty-two Topographical Officers, eighty-eight Intelligencers, with six for the Intelligence Office, making a total, ninety-four.

For the Guide detachments in the Madras and Bombay Presidencies, the cavalry soldiers must be used instead of the Guides of the Punjab Frontier Force.

The distribution of the European and Native Agents is given merely as a guide to ascertain the smallest possible number that might be required. They might all be employed in one spot, if the head of the Intelligence considered it necessary. The special service money would accumulate to the credit of the department if not spent, thus affording a fund for rewarding services in the field.

The Military Budget would be increased by the following estimated charges connected with the Intelligencers, per man, yearly.

	Rs.	
Clothing	80	As a mounted Sapper Sergeant. Undersized stud-breds would be used.
Keep of Remount	240	
Wear of Saddlery, &c. ...	10	
Do. of Camp Equipage ...	40	{ A strong light Pal with double roof. One Baggage Pony between two Intelligencers.
Cost of Carriage	50	
Quarters	30	If not supplied with Government Quarters.
Rs.	450	

With ninety-four men this would give an yearly charge of 42,300 rupees, which added to the 3,60,000 Rs. given above, would bring the cost of the Department to over four lacs of rupees a year, not reckoning the Staff Corps pay of the Officers, which may be taken at about Rs. 10,000 a month, or Rs. 1,20,000 a year. The total yearly expense would be approximately—

Staff Corps Pay of Officers ...	1,20,000
Staff Allowances, &c. ...	3,60,000
Charges for Intelligencers ...	42,300
	<hr/> 5,22,300

In the scheme for the Organization of the Intelligence Department for the Army everything has been based on a military footing, as far as possible, so that the Commander-in-Chief may be able, through the Deputy Quarter Master General for Intelligence, to be thoroughly informed on all points in the event of war; but it has to be borne in

mind that there exists already an Intelligence Department in connection with the Foreign Office, which transmits information on the points which are required by that Office. The plan of submitting the names of proposed agents in foreign countries to the Government, would therefore be necessary, for it might be considered unadvisable to have two agents in one place, though the geographical information undoubtedly requires an informant of some education. By making Government the arbiter as to the employment of the Agents in connection with the Military Intelligence, there will be no chance of any clashing in the working of the two departments. If the regular agent is capable of transmitting answers to every question that may be asked him, there will be no necessity to substitute any one else, but it must be remembered that no single agent can ever be relied on, and that, even if there is already a Foreign Office Agent in any country, there can be no harm in testing his assertions by means of another man.

The end pursued by the Foreign Office is moreover so very distinct from that to be set before the Intelligence Department, that in all probability it will be found that two agents will generally be required, though the trial may be at first with one man. An agent, who was good at Political History, giving the ordinary daily current of life in the spot where he was, could hardly be expected to furnish the routes across country, which would necessitate his leaving the centre whence he retailed his bazaar gossip. Hereafter when all the geographical information is collected, one man may be sufficient to keep it up to date, for the face of the country does not change as quickly as its inhabitants, but our primary duty being to collect as quickly as possible the information wanted, even more than two agents could be employed at present with advantage.

Whatever number of men are employed, whether by the Intelligence or the Foreign Office, it is beyond all question, that unless the two departments work harmoniously together, mutually exchanging information, there will be much loss of labour, time and money. The Foreign Office would depend on the Intelligence for translations of works that they might want, or any other information, while the Intelligence would ask for information from the Foreign Office on points which the latter could furnish.

Both departments being mutually necessary and complementary to each other, the Military Intelligence Department in time of peace could not exist without the aid of the Foreign Office, and though the latter has sufficient independence of action to do, in a measure, without the former, yet it would be none the worse for assistance from this source ; the two departments in combination would be equal to any demand that would be made on them as regards foreign countries, and working towards a common end, the success of all operations of war would be assured, in proportion as their joint labours had been successfully carried out.

J. A. S. COLQUHOUN, CAPTAIN,
Royal Artillery.

II.

MEMORANDUM ON THE ESTABLISHMENT OF AN EUROPEAN AND EURASIAN MILITIA IN INDIA.

THE following Memorandum was written when the writer was at the Staff College, Sandhurst, in 1872. The recent discussion on the education and future of the Eurasian population of India has induced me to publish it. I have not had the advantage of seeing all the various articles and letters which have appeared recommending the formation of regular battalions of Eurasians. I believe that such military training as I have ventured to suggest in the following paper, would in itself be a physical education of great value, and I certainly do not share in the opinion of those who aver that the Eurasian is incapable of bearing arms, and of making common cause with the European for the maintenance of order, and the supremacy of the British power in India. I have thought it better to let the paper stand as originally written, but it appears to me that I have considerably understated the numbers available. In my late tour through India, I have been much struck by the large and increasing numbers of the non-military European and Eurasian population, which, if properly organised and armed, would form a far greater strength to the empire than the fortified posts into which they are supposed to fly for the protection of themselves and their families in time of local disturbance. Fortified posts are doubtless of great value, as places where the women, children, the aged and infirm could be safely housed, but they would be trebly advantageous if we knew that their defence might be entrusted to a local militia force, and every British soldier set free for service in the field.

The assertion that any state has the right to demand the services of its citizens for defensive purposes will scarcely admit of controversy.

In England this right has been put in abeyance. Whether this abrogation of distinct right be wise or not, and whether England may not eventually be obliged to insist upon the fulfilment of a certain amount of military duty, obligatory to all for defensive purposes, it is not the business of this memorandum to discuss. But even if it be granted that a large system of national defence is unnecessary for England herself, the arguments supporting this opinion cannot apply to her colonies and dependencies.

England has a large and powerful fleet, and a garrison of regular troops and auxiliary forces, probably sufficient (if properly organised) to meet with success any power likely to attempt the difficult, but not impossible, task of the invasion of our country.

The colonies and dependencies of England are, however, too extensive to be simultaneously defended by the Imperial Armies and fleets. Accordingly, it is not unnatural to look for efforts to provide means of defence locally, in the important portions of the British foreign possessions.

Before endeavouring to suggest an increase to our present local means of defence in India, it will be well to allude briefly to what has been done in other portions of the British empire.

In *Canada*, all men in that dominion between the ages of eighteen and sixty, are liable to military service in defence of the country. The Militia consists of an 'active' and a 'reserve' force. After three years service in the active portion of the militia, a man falls into the reserve, and in this reserve he is not liable for military service until all the men between eighteen and forty-five in the "company divisions" in which he resides, have volunteered or have been balloted to serve.

According to a return dated 1868, the Militia of Canada consisted of 43,541 active, and 612,467 reserve troops.

It is unnecessary to enter into details concerning the military organisation of this force, or to describe the military division of the country and the military training to which the Canadian militia is subjected. It is sufficient to say that the organisation appears to be clear and simple, with high defensive value, considering the especial situation of Canada, and the very light burden thrown upon the country.

It is not assumed that such a militia force, or that *any* militia force, would be capable of coping successfully in the open field with the highly trained and disciplined forces of a continental power.

In Canada, however, the proper organisation exists which would render difficult any offensive attack by the United States, because that power has only the nucleus of a small army, supplemented by a militia force, which in a few years, and when the experienced soldiers of the Civil war have passed from the ranks, will probably be of no higher military value than the force Canada could put in the field.

In the *Australian colonies* very considerable progress has been made in the formation of corps of infantry, cavalry, artillery and engineers. It seems to be an undisputed fact, that the withdrawal of British troops has largely developed an energetic military spirit of self-defence in most of our colonies, and although the numbers of these local forces in Australia bear no comparison with those obtained under the obligatory system of Canada, it cannot be denied, that the formation of corps which (it is stated) would enable a force of 40,000 trained men to be put in the field, in time of need, is a most valuable organisation for defence, and a real accession to the military strength of the empire. The regulations for the training of these colonial forces appear to be excellent, and nothing seems clearer than that the military spirit of the Australian colonists is very strong, and that the small sacrifice of time, &c. is voluntarily and cheerfully made.

This appears to be the more extraordinary, as the Australian colonists have nothing to expect from any movement by the native

population, while the invasion of the country by a hostile European power is, to say the least, somewhat remote.

In the Empire of India we hold vast possessions by means of the equitable government of the country, supported by a force of British soldiers, whose numbers cannot, according to all the best authorities, be much reduced without endangering the safety, or at least the tranquillity of the country. The Native Army is a necessity for the due preservation of order, for the defence of the frontier, for the execution of duties which cannot be performed by the comparatively small force of European soldiers, and for the prosecution of wars beyond the frontier of India.

It may be objected that Her Majesty's Government would never withdraw any large number of troops from India, and by such a course endanger the safety of the country.

In reply to this we may enquire, whether English statesmen, however cognizant of Indian affairs, and desirous of doing justice to India, are sufficiently powerful to be able to resist the demand for trained British soldiers, if an imperial necessity should arise for their employment ?

And, further, whether under such circumstances the interests of England would not be considered paramount, and India left to shift for herself ? It must also be remembered that under our present system and at this date, if a sudden demand arose for a large body of trained soldiers, we do not possess adequate means of supplying them at once.

The reserve system cannot be practically efficient for many years, and in the warfare of the present day *time* would not be given, as heretofore, to enable England to bring up her army to the required strength by a lavish expenditure of money. India would be regarded as the natural reservoir which must be drawn upon, and the voices of those in England who might denounce such a course, would be drowned in the universal clamour for trained soldiers, in preference to obtaining (even if that should be possible) a crowd of undrilled boys.

It seems scarcely necessary to consider the argument that England is not likely again to be engaged in a continental war. Whatever the policy of an English Government might be in this respect, and however great may be the progress of the doctrine of separation from European interests or disputes, it requires no great political knowledge to be aware that popular feeling in England might force upon the most pacific government, a war which should be entered into for the protection of English subjects, to avenge an insult to the English flag, or even to uphold those treaty obligations by which we are still bound (provided popular sympathy be with the engagement).

After the events of the last few years, it will scarcely be assumed that any amount of moral right will restrain powerful foreign govern-

ments, backed up by immense national armies, from entering upon wars for the acquisition of territory ; nor does it require a highly vivid imagination to believe that England may, even in the present generation, be called upon to oppose her strength to a rough solution, by the sword, of the Gordian knot known as the Eastern question.

Turning then to India, as standing in a somewhat isolated position, we may do well to consider whether her means of defence, against either external or internal foes, do not admit of fuller development.

It is unnecessary to refer at length to the Mutiny of 1857. The events of that time are too deeply impressed upon the minds of those who had the honor of assisting in the great successful efforts made to reinstate order, and the supremacy of the British power. Nor would it be profitable, or within the ability of the writer, to discuss the many great political and social questions which would be involved in a consideration of the loyalty of the various peoples of India, the elements of disturbance in the subject-population, and the influence for evil which might possibly be exerted by Russia, at some future time, to aid the development of her avowed policy with regard to Turkey.

These questions, however deeply interesting in themselves, are foreign to the design of this memorandum.

If it be granted that the present British force cannot be greatly reduced, without endangering the safety of India, and that it is possible H. M.'s Government might at a time of European complication or disturbance, involving England, withdraw from India a portion of the British Army, then surely we have sufficient grounds for assuming that any means which shall assist to secure the safety of India would be welcomed, provided that the means did not carry the remedy of burdensome expenditure, often worse than the disease it professes to cure.

Indian statesmen, whether soldiers or civilians, are well aware of the necessity for maintaining a strong military power as the basis upon which the Government of India must rest for many years, or even centuries. The usefulness of Volunteer Corps has been upheld by the Government of India, and its cordial sanction and support given to those established on the railways, in the Presidency towns, and in various parts of India.

The necessity for the establishment of fortified posts, not indeed as fortifications to enclose large forces which could be better employed in the field, but as 'reduits' or posts of protection, in which the women and children could be collected, and which could be defended by a few troops assisted by the European residents, has been recognised by the Government of India.

Nor has the important principle of making India self-supporting in munitions of war been lost sight of, but has been most practically acted upon.

The establishment of Volunteer Corps in India cannot be sufficiently acknowledged by those who think and act for the safety of our Indian Empire. But, it is submitted, the existence of these corps only demonstrates the advantages which would result from a further development of the means of internal defence.

This further development is the establishment of an obligatory universal militia service, for all non-military Europeans and Eurasians capable of bearing arms.

In this idea no new or startling principle is involved. The proposition is only to create a defensive organisation in time of peace, by which the safety and security of the British rule may, as far as human foresight can suggest, be greatly increased.

But, it may be said, there is plenty of time ; and it will be sufficient to prepare for a time of need when the occasion arises. In answer to this may it not be said, that the time immediately preceding the coming trouble—whether internal or external—is scarcely that at which we should endeavour to inaugurate such an addition to our military system.

The very effort which would be made might precipitate the evil we wished to guard against. The minds of all would be disturbed by apprehension, and surely such a time would be unfit for calm and well-considered military organisation.

However disinclined Englishmen may be to imitate every thing Prussian, may we not safely take an example from them in their great forethought in military organisation ?

In their system, nothing is left to chance, or the probability that when a great want occurs, it will be met somehow. Every thing is provided for, as far as human ingenuity can foresee or devise.

It is this part of their military system we might imitate, without servilely copying them in every particular and every detail, and without endeavouring to force a military burden for *offensive* purposes upon the country,* which even in Prussia required great national disaster to render adoption practicable.

Before even attempting to consider the numbers which might be raised, let us state the specific object for which such a militia force in India would be suitable.

The first great object would be the formation into organised bodies of those capable of bearing arms, whose interests and feelings are identical with the safety and supremacy of the British Government of India. The employment of these bodies would be indicated in the following enumeration of duties to be performed in time of need or imminent danger.

* Referring to England.

- (a) Garrison of the fortresses at the capitals.
- (b) Garrison of the fortified posts in the various stations.
- (c) Keeping open lines of communication, (for instance, as proposed for the Railway Volunteers.)

For these duties no high military training is required—nor even in time of need would continuous service be necessary. If ever the occasion arose, a man might surely follow his ordinary avocation, whether in an office, or in any profession or trade, as well when dressed in uniform and with his rifle beside him, as without these belongings of military service; and perhaps it may be stated, much better and more calmly than when men's minds are full of panic, and apprehension of danger unprepared for. But this great advantage would result. Every man would know his place, and what was expected from him, while the Government of India could gauge accurately the military strength of the country. The institution of a militia service in India need be accompanied by no effort to rival the regular forces in drill, or to require a high degree of military efficiency. Such a course would render the movement unpopular, and would disturb the ordinary occupations of peace.

The amount of drill required during the year, might be placed at a minimum. Once start the system, and it would probably be found that the military efficiency would improve without any pressure.

But even supposing the efficiency (in comparison to regular troops) to be of a very low order, we should still secure enormous advantages in knowing how many men in India might be depended upon for the objects we have indicated, and when the occasion arose, we should have the material upon which we could work under the high pressure of self-preservation, and the most powerful motives which can operate upon the human mind.

Nor must we omit to consider that it is not desired to institute a militia* force such as exists in England, and where continuous training, involving absence from homes, is necessary to fit that portion of the auxiliary forces for combat against a continental invading army of trained European soldiers. All that we require is *organisation*, a moderate amount of simple drill to accustom men to act together in the most ordinary formations by which bodies of men are moved, and elementary instruction in the weapon placed in their hands. In fact, the training should be of the most simple and unambitious character, so that the time required for drill during the year should be the least possible.

Having thus endeavoured to show, that no heavy military burden is required to be laid upon the non-military European and Eurasian

* Militia in India would be of course for *local* service—or *Garrison* service chiefly.

population of India, let us enquire what numbers* might be obtained for this proposed militia.

For the purposes of this memorandum, it is not necessary to be completely accurate, even if it were possible, and probably the census of 1871 will show a considerable increase.

Let us, however, first take the Presidency towns.

In Calcutta there were in 1866 about—

22,000 Europeans and Eurasians, 50 per cent. being women, boys and girls, so that the number of males to be considered for our proposed service would be about 11,000.

In *Madras*, by the census of 1867, there were about 17,000 Europeans and Indo-Europeans, and if we accept the above percentage of women, boys and girls, we should obtain about 8,500 males.

In *Bombay*, in 1864, there were 10,306 ; and treating these figures in a similar way, we obtain about 5,000 males.

By the last returns† for all *India* the following numbers are arrived at:

‡ Europeans (exclusive of army)	...	80,000
‡ Eurasians	... ..	82,000
		<hr/> 162,000

Assuming 50 per cent to be women, boys and girls, we obtain, as available males, about 80,000 Europeans and Indo-Europeans.

And even if we assume a higher percentage of women, boys and girls, and allow for persons unable to bear arms, we still obtain a number of men sufficient to be formed into a large and important militia force.

The total number of Volunteers for all India is a very small percentage of the above number, and cannot truly represent the latent power which may be utilised for the security of the empire.

It is not feasible, nor indeed desirable, to attempt a discussion of the organisation of the proposed force, the age between which men should be liable, the equipment, number of drills in the year, payment during drill, appointment of officers, the division into *classes* as to age, whether men past a certain age should be exempt from drill and exercise though

* For his figures the writer has nothing newer before him than "Annals of Indian Administration 1868-69."

† Statistical Abstract relating to British India, 1861-1870 (India Office).

The first is a compilation from official returns.

His numbers, therefore, will probably be considerably under the mark.

‡ See pp. 111-112 *Annals of Indian Administration*, part 1, Vol. XIV.

§ It is believed this division is not very accurate, but the total is fairly so.

liable for service, the cost of the proposed measure, &c. All these points and many more, require to be carefully considered. They are by no means difficult of just solution. The militia systems of England, Canada, and Switzerland, might be advantageously studied, in order that those dealing with the question might see how far certain points in these systems are applicable to India.

But if once the principle be admitted, if once the proposal be pronounced good by those competent to judge, the details could be easily worked out.

I have not alluded to the physical benefits of even a small amount of military training, but I believe these benefits are not to be undervalued.

One chief point upon which it is necessary to remark, is the necessity for making the service, at the outset, as light as possible. Instructors might be furnished from British regiments to drill those whose business might not allow them to give much time to the first preliminary training in squads. And this preliminary training might be measured by an examination, at all events in certain portions of drill (as for instance, "manual firing exercise for Infantry,") which should exempt the recruit from further *preliminary* drill in that part of the subject.

But these are points which may fairly be left for a future time.

I cannot help expressing a belief that there is no country, where a light militia service would be more welcomed than in India. It is scarcely an exaggeration to say that the European carries his life in his hand, and not only his own life, but those dear to him.

In India, more than any other country, every motive would prompt a man to make a very small sacrifice cheerfully, to assist in securing the safety of the empire. Nor, among the Eurasians, would be wanting that spirit which would support a movement identifying them with the pure European and render it popular.

I have no wish to conclude this memorandum by a sensational description of the scene, which is familiar to those who can recall what took place in Calcutta on a certain Sunday during the mutiny of 1857. But even during the time I was in India, there have been panics at certain stations, somewhat disgraceful to the English name, and certainly injurious to the prestige of the British Government. I maintain that the existence of obligatory militia service, would remedy this class of evil, and that it would be no light or unimportant advantage if a Government, charged with great operations, either within or without India, knew that it could entrust the safety of the capitals, the main strategic points, and even the smaller stations, to an armed force sufficient to quell any disturbance, thus setting free every effective British soldier for service in the field.

This memorandum is written in no spirit of apprehension for the present. But we cannot afford to set aside the lessons of the past. The history of the next decade may, or may not, be full of dangers to England or to India. Of this, however, we may be certain, that danger to England will reflect itself a thousand fold upon India.

It is assuredly sound wisdom, while every effort is being made for the welfare of British India and its millions, to ensure, by every means in our power, the safety and tranquillity of that vast empire.

E. H. H. COLLEN, *Lieut., R. A.,*
Asst. Secy. to Govt., Mily. Dept.

III.

A SCHOOL OF MUSKETRY FOR INDIA.

IN India, during the last few years, Garrison Schools have sprung up and expanded, classes for Army Signalling been formed, and other means of acquiring military knowledge placed within our reach. No opportunities are, however, afforded for special instruction in Musketry. The question of expense alone probably deters Government from establishing a School of Musketry. Let me then endeavour to point out how such a school might be cheaply instituted and conducted.

Locality.—The site chosen should be in the vicinity of a station centrically situated and easily accessible by rail. Waste land would be required for the construction of rifle ranges.

Staff.—I would suggest that the *permanent* staff consist of an officer Commandant, together with two Captain Instructors, two Lieutenant Instructors, and a Serjeant Major. The tenure of office of the four assistants to be limited to three years, and the appointments equally divided between officers of European regiments and the Staff Corps.

A Staff Surgeon and medical subordinates, an Armourer detached for duty from the nearest arsenal, ten European Serjeants, ten Havildars, and a few natives, would complete the *temporary* establishment.

Accommodation.—In addition to two ranges in pairs, the only permanent buildings necessary would be a barrack and magazine. The former comprising a large apartment for lectures, and a museum, two smaller ones for lock instruction, catechising, &c., a store and orderly-room, an armourer's shop, a canteen, and quarters for the Serjeant Major. As the course would only take place during the cold weather, officers and men could then live in tents.

Arrangements.—The school might open annually on the 15th October, and be closed about the 1st April. The non-commissioned officers being changed every year, would during the first month, themselves undergo a course of instruction, and afterwards be employed as musketry "drills." The Europeans would also have to undertake certain duties, such as those of orderly room clerk or canteen superintendent. Their certificates of qualification not being given them until the expiration of six months, they would then be eligible for the post of Serjeant Major or Serjeant Instructor of Musketry in their regiments, or for Color Havildars in the Native Infantry. No private soldiers or sepoys would be admitted, as the proposed establishment could not provide for them. The course would last for six weeks, and there would be three yearly. Each class to be formed of 50 officers, 15 European and 15 Native non-commissioned officers. As at Hythe the school should be divided into wings. In our case let the right wing be for officers and N. C. officers of British regi-

ments ; the left for officers of the Staff Corps and Native non-commissioned officers. The course, generally, being strictly modelled on the English school, if thought desirable, questions for the examinations might be sent, and certificates granted, from there. A limited number of Volunteer N. C. officers might be allowed to attend from time to time. In the hot season the school would be under the charge of the Sergeant-Major, assisted by a small native establishment. All Guards and Musketry fatigue-men would be furnished by regiments in the station.

Advantages.—1. At a small cost to Government, 150 officers and 110 N. C. officers would annually receive a thorough education in Musketry.

2. A supply of N. C. officers would always be at hand to fill vacancies as they occurred.

3. Musketry would be more generally understood, especially in the native army. At present officers of the Staff Corps are virtually debarred from Hythe.*

4. Sub-Lieutenants are not allowed to attend the School of Musketry, and some years may elapse before those in India have an opportunity of qualifying for the post of Adjutant or Instructor.

Such then is a rough sketch of the proposed school: an approximate calculation of its cost can easily be made.

C. A. FILLINGHAM, *Lieutenant,*
Instructor of Musketry, 65th Regiment.

* A glance at the "Annual Reports on the instruction carried on at the school of Musketry, Hythe" shows us that, during the past three years, only 37 officers of the Indian Army were trained at that place.

The "Bengal Army List" gives the number of Bengal Staff Corps officers holding certificates, as under one hundred.

IV.

Memorandum for Medical Officers in charge of troops and coolies proceeding by transport to join the Duffla Expedition.

THE Quarter-Master-General of the Army points out that every possible precaution to preserve the health of the Troops and Coolies, proceeding to the base of operations, should be impressed upon the officers in charge of the several detachments. The rivers of Eastern Bengal are seldom free from cholera during the latter months of the year, and it is only by not permitting crowding, by a liberal use of disinfectants, and by enforcing cleanliness that sickness can be avoided.

The above general view is given for the information of Medical Officers.

2. On coolies first going on board, it should be ascertained if their bundles contain indigestible food or old rags: all of which should be destroyed. Their clothes should be clean. Medical Officers of troops will understand how to warn their men on these heads.

The men should be examined daily by the Medical Officer. They should rise early, and after dusting their blankets to leeward should fold and sling them out of the way.

Clothes, mats, blankets, &c., should be aired and put in the sun as often as possible, especially during damp weather.

3. In the early morning the decks should be freely sprinkled with a mixture of McDougal's powder, of three ounces to a gallon of water before sweeping. This lays the dust, and prevents it settling on the bundles and roof: after the sweeping, the powder itself might be lightly strewed on the deck. Decks should only be washed down when weather, time, and other circumstances permitting, the men may be landed, or accommodated in another place, until their deck is thoroughly dry. They should also be dry holly-stoned at regular intervals.

4. The greatest care should be taken to keep the latrines clean; that sewage passes clear of the side of the vessel; that no urinous or bad smells exist. McDougal's powder, in the proportion of six to eight ounces to one gallon of water, should be used for latrines, two or three times a day, or as often as required.

5. The coolie sirdars or other officers should be instructed to visit their men at intervals, and bring all cases of sickness to notice. Slight ailments can be treated at the dispensary, but all more serious cases should be treated in hospital. The sick should be attended to as in a good hospital on shore. Diarrhœa should be watched for and attended to immediately.

6. In the event of cholera or small-pox or other communicable disease occurring, the patient, with all that belongs to him, should be

thoroughly isolated from the healthy. All clothes, blankets, mats, &c. that have been in any way in contact with him, or have been soiled, or are suspected of infection or impurity, should be thrown overboard, or burnt on shore in the presence of a responsible Officer.

7. On a case of cholera, &c. occurring, McDougal's powder and carbolic acid should be used freely round the patient; matters purged or vomited should be received on small broken coal & sand, or ashes, and then covered with the powder, &c., and everything in the shape of clothes or vessels soiled, cleared away and cleaned as quickly as possible. The place on board should be also vacated, the deck and woodwork thoroughly cleaned, scraped, and scrubbed with hot sand if procurable, and the strong mixture of disinfecting powder. A solution of the common sulphate of iron, 10lbs.; carbolic acid, 1lb.; to five gallons of water is also good to wash a soiled deck, and to clean vessels that have been soiled.

8. Fumigation by burning 4 oz. of sulphur, and clearing the atmosphere subsequently by hanging up pieces of woollen substance or tat saturated with the stronger mixture of McDougal's powder, can also be employed; and this latter plan prevents flies. Pieces can also be hung round the hospital; and if hung about the lower deck in the evening will keep the air free from the smell of men and clothes through the night. Latrines suspected of having been used by choleraic patients, should be purified by fumigation, and subsequent scrubbing with the copperas and carbolic acid solution.

9. The first case of any such illness should be earnestly watched for. The object is to prevent and not to wait for an epidemic, which may be checked by promptly attending to premonitory symptoms, isolation of the sick, general and personal cleanliness, careful disposal of excreta, disinfection and destruction of infected articles, free ventilation and general care of the healthy.

10. Should cholera become epidemic, the healthy should be landed on a suitable spot; while the whole of the decks are scrubbed, and the other measures used for purifying the vessel. The sick are to be also landed, isolated, and their deck space thoroughly purified. The principles on which to act are: the preservation of healthy men by enquiry as to premonitory symptoms, the separation of the sick and suspected from the healthy, isolation of the affected, and preventing the spread of the disease. More definite rules cannot be laid down, and the Medical Officer must act as prompted by his knowledge and experience. Should fresh cases subsequently occur, the same procedure must be adopted. The men must not remain in the vessel if it can possibly be avoided, until the disease subsides. The bilges of vessels should be examined if necessary.

11. The Medical Officers of Stations arrived at, must be informed of the occurrence of any epidemic, and measures taken in concert with

them. If there are any severe or continued fevers, or any of a typhoid form, they should be left at the Station for treatment.

12. It is desirable that vessels should anchor in the afternoon so as to admit of the men landing for cooking purposes; they might take their bundles and blankets on shore, and shake and air them; they should not be allowed to visit villages or bazars in the vicinity. The vessels should not lie near a defiled or unwholesome bank. When landing is not practicable, there are cabooses on each vessel for cooking purposes for those who do not object to cook on board, while for those who do object non-cooking rations will be obtainable.

If the place for landing should be near a village, or at any Station, inquiry should invariably be made before the men go on shore, whether there is cholera, &c., in the neighbourhood. While the men are absent, the decks, &c., should be thoroughly sprinkled with the mixture of McDougal's powder, and well swept as before. After cooking, the men should return to the vessel to sleep: to remain on the banks of the river would be hurtful.

13. Personal cleanliness should be looked after. Healthy men should bathe daily unless it is against their habits. A safe place for washing should be provided. Clothes should be washed as often as practicable or necessary. It may be requisite even to stop the vessel for an hour or two for this purpose.

Twelve superficial feet of space is allowed for each adult, exclusive of hospital space, gangways, hatches, decks opposite latrines, space for crew and attendants, &c. Hospital space is given for 5 per cent. of sick, at 24 superficial feet per man. The men must be properly arranged at night, and all crowding and huddling together prevented; they should be with their heads towards the centre of the deck. There will, generally, be a free deck space between the lines of men of from eight to twelve feet, according to the breadth of the vessel. The ventilation at night should be attended to. Care should be taken that the men are sufficiently covered at night. Men might be exercised on deck during the day.

Flats are directed to have a canvas curtain hanging from roof to deck, with ventilating space under the eaves above, but fastening when down close to the deck below, for enclosing the deck space; a boarding one foot high rising from the plank-sheer of the vessel; and netting, or some defence, from plank to rail above. Lanterns should burn all night in the dispensary, near privies and gangways, and on the decks.

14. Accidents should be guarded against; the railings of all exposed places such as the side of the vessel, near hatches, ladders, bathing places, latrines, communication and landing stages, &c., should be examined from time to time. The presence of life buoys should be ascertained. Men should not be allowed to draw water over the side of the vessel when it is in motion.

15. Latrines, with canvas screens in front, are fitted as far aft as possible; canoes are placed as far forward of latrines as space will admit. These offices should be sufficient in number. Two tubs kept filled with water, should be close to the latrines. A well-protected bathing place should also be provided.

16. The drinking water should be carefully attended to. Two 400 gallon tanks with covers are generally on board; a constant supply should be kept up in them: they should be used alternately, allowing water to settle after the addition of six grains of alum to the gallon. Water to fill the tanks while on the voyage, should be taken as far forward as possible. Water is not, however, stored when that of the rivers is considered of good quality and clear. Good water should be used for cooking.

Every effort should be made to prevent the men from drinking the river water fresh drawn from the side of the vessel, unless it is known to be good. If muddy water is drunk it acts as an irritant.

Food issued should be inspected from time to time, and any complaints attended to. Care must be exercised that the men do not overeat themselves, or use foods that they are unaccustomed to.

17. The men in each vessel should be made as comfortable as circumstances admit; and care should be taken that the arrangements for feeding, cleanliness, &c., &c., are systematically carried out.

There is a sufficient stock of medicines, hospital necessaries and comforts, bazar medicines, and the disinfectants on board, for the medical wants of the men during the probable duration of the voyage of fifteen days.

18. During any railway journey, it should be noted that each man is allowed four superficial feet of space, and that not more than sixty should be in each carriage. The men should not want for food; there should be a supply of good water; and a short stoppage should be arranged for, at each station, to permit men who require to get out, to do so.

J. T. C. ROSS, F. R. C. S.,

Deputy Surgeon General,

DACCA CIRCLE.

NOTICE.

MEMBERS of the Institution who have not already done so, are earnestly requested to pay their arrears of donation and subscription, either to the Corresponding Members at their stations, or direct to the Secretary at Simla.

Some members still owe their donation and three years' subscription.

Officers, who may wish to become members, are requested to be kind enough to forward their donations and subscriptions at the same time as they express a wish to join the Institution, and also to inform the Secretary whether their subscription is intended to be for the current year which ends on the 31st May 1875.

Members can pay their subscription to the Alliance Bank, Simla, if more convenient, and the Bank will grant receipts for any money sent.

The entrance fee is 5 rupees and the annual subscription 5 rupees.

Members on changing their addresses are particularly requested to notify the change to the Secretary, in order that delay in forwarding the Journals may be avoided as much as possible.

The address book is corrected up to date from the Army Lists, but mistakes are occasionally unavoidable unless members themselves promptly notify their change of residence.

Members proceeding to England on leave, who wish the Journal to be forwarded to them while absent from India, should inform the Secretary, and send stamps for the overland postage by Brindisi or Southampton as they desire.

When a member appears in orders for leave to England, his Journal is not despatched unless he asks for it, and while absent from India his subscription is not payable unless the Journal is supplied.

Members on return from furlough can obtain the numbers of the Journal that have been published during their absence, by paying the subscription for that period, and all members on returning to India should inform the Secretary of the fact at once.

The Secretary will be happy to send an Index to volumes I, II, III to any member wishing for the same.

H. H. STANSFELD, LIEUT.-COLONEL,
Secretary.

NOTICE.

AN Exhibition of Military drawings will be held in the Reading Room of the Institution during September 1875.

All drawings intended for competition to be with the Secretary by the 1st September.

The first prize will be of the value of Rupees 100, and the second prize of the value of Rupees 50.

The prizes will be awarded by a Committee of the Council.

All Officers in India being Members of the Institution are eligible to compete.

The drawings to consist of "Military sketches of ground, executed in the manner taught at the Garrison Instruction classes throughout India."

H. H. STANSFELD, LIEUT. COL.,
Secretary.

SIMLA, 1st May 1875.

ORIGINAL PAPERS.

I.

REPORT ON AN APPARATUS FOR COOLING WATER MANUFACTURED BY THE PISTON FREEZING & ICE COMPANY, 315, OXFORD STREET, LONDON.

1. About the end of July, 1874, Mr. Cunningham, the Advocate General of Madras, asked me to see what could be done towards giving a patent water cooling apparatus, that was in his possession, a fair trial among the soldiers of my regiment.

Apparatus required to be tested.

2. Accordingly, on the 3rd August, by the kind permission of Major L'Estrange, then commanding the regiment, the apparatus was set up in the Officers' Mess, to test its cooling powers. After having been tested thus for four days it was removed, and set up in the regimental coffee shop, by the permission of Colonel Dalyell, that place being considered the most convenient for the proposed experiments.

Where tested.

3. Before testing the apparatus I requested Doctors Loughheed and Rahilly, of the 1-21st Fusiliers, to see if any material had been used in its construction likely to cause injury to persons drinking the water kept in it : they reported that the apparatus was perfectly harmless, and that no injurious effects could ensue from the use of the water.

Apparatus contains no materials injurious to health.

4. The apparatus, which is cylindrical in shape, is made of tin, covered over on the outside with a thick coating of felt. The height of the portion containing the water is 20 inches, and its diameter 17 inches : it is capable of containing 12 gallons of water. In the centre of the top of this portion of the apparatus, is a circular hole of $8\frac{1}{2}$ inches in diameter, through which can be let down another cylinder 20 inches in length ; and $8\frac{1}{2}$ inches in diameter the purpose of this cylinder is to contain the ice used for cooling the water : its capacity is 15lbs., it is made of zinc, the outside, which is exposed to the water, being coated over with tin. At the bottom of this cylinder is placed a small

Description of the apparatus.

stand, 5 inches in height, fitting loosely into the cylinder, and perforated with 20 holes to draw off the water from the melting ice. The whole apparatus is closed in by a lid thickly covered with felt. There is a small funnel communicating with the water containing portion of the apparatus, through which fresh water is poured in when required. The water is drawn off by a cock placed near the bottom of the apparatus.

5. It was desired that this apparatus should be tested with a view to ascertaining the probable cost per mensem of keeping water therein at such a temperature, that it should be cold and grateful to the palate. Objects with which the experiments were made. As nothing apparently was known of its capabilities, it was determined, in addition, to test it in as many ways as possible, and to note down any defects in its construction or working, that might become apparent during the experiments, together with such improvements as might seem to be desirable.

Detail of the objects of the experiments.

6. With these objects in view—

- (a) At every trial the mean atmospheric temperature and the mean temperature of the water used for cooling was compared with the mean temperature of the water offered to the soldiers, after being first cooled in the apparatus.
- (b) An account was kept of the quantity of the ice used at each trial, and of the state in which it was when used, whether in two, three, four or more pieces, or broken up, because the larger the pieces of ice are the more slowly the ice melts and the longer time it takes to cool the water.
- (c) The quantity of water used for cooling each day was noted and the quantities by which it was poured into the apparatus.
- (d) The heat of the water undergoing the process of being cooled was taken several times throughout each trial, both when there was ice in the ice-cylinder, and when there was none in it.
- (e) The length of time the ice lasted was ascertained each day.
- (f) The quantity of water that was drunk every day was marked both during the trials and between the trials.
- (g) The cost per glass of water ($\frac{1}{2}$ pint) was estimated with regard to the cost of the ice used to cool it, at the daily rate of consumption.

7. Having thus briefly set forth the objects of the experiments, I propose to give a short history of them, relating the facts from which my conclusions have been drawn. History and conclusion to be related.

8. On the 3rd of August about 6 P. M., ten gallons of water were

The temperature of the water in the apparatus not much affected by the temperature of the outer air.

put into the apparatus at a temperature of 88° in order—(1st) to sweeten the water cylinder, and (2nd) to see if the heat of the water was at all affected by being merely put into the apparatus. The night was a very hot one, the average temperature being about 90° , but the morning was much cooler. The water was left in the apparatus for seventeen hours, and its heat was found to be still 88° , when it was drawn off, although the temperature of the atmosphere was then only 86° . From this it was concluded that the temperature of the water in the apparatus was certainly not much affected by the temperature of the outer air; and that therefore the apparatus at least answered one of its objects.

9. Before proceeding further it may be mentioned, that by

The meaning of the term
“atmospheric temperature.”

“atmospheric temperature” is meant the temperature of the air immediately surrounding the apparatus.

10. The instruments used for ascertaining temperature were Neg-

The thermometers used.

retti and Zambra's maximum and minimum self-registering thermometers. One pair being placed

immediately above the apparatus to ascertain the mean temperature of the atmosphere, and one pair inside the water cylinder to ascertain the mean temperature of the cooled water. Besides these, an ordinary Bath-thermometer was used to ascertain the heat of the water at various hours, &c. All the thermometers were supplied by Messrs. Orr and Son, Madras.

11. The water used for cooling was filtered water from one of the

The quality of the water
used for cooling.

ordinary “Chatty-filters” supplied to the men. Its temperature was that at which it is usually drunk by them.

12. On the 4th of August the apparatus was filled with water,

History of the first day's
trial.

the full quantity (15lbs.) of ice was used. The ice was in two large lumps and several small pieces. The mean temperature of the water,

used was very high, being 84° . Only a small quantity of water (2½ gallons) was drawn away during the day, so the trial was a fair one. In 1½ hours the heat of the water declined 6° ; in 8 hours 12° ; in 12 hours 22° , and the greatest declension reached was 29° ; 12lbs. of the ice melted in 8 hours, and in 12 hours it was all gone. After the water had been kept for 10 hours without ice, its heat was found to be still 16° below the average temperature of the water put in. The mean temperature of the water offered to be drunk was, during a twenty-one hours' trial, 18° below the mean temperature of ordinary drinking water, and at the end of that time was still 16° below it. The capabilities of

Results.

the apparatus for cooling the water, and *keeping it cool*, its principal object, began to be thus indicated at the very commencement of the experiments.

Time of putting the thermometers into the apparatus.

13. In order to ascertain fairly the mean temperature of the water in the water-cylinder, the thermometers were usually put into it from two to four hours after the ice had been put into the ice-cylinder.

14. It must be remembered that the records of the various temperatures, hours, weights, etc., are merely *approximately* accurate, as it was not considered that the value of the experiments would be enhanced by making the statistics minutely accurate, and thereby indefinitely increasing the labor of collecting them.

Daily wastage of the ice. 15. It may be here mentioned that the average daily wastage of the ice, before it could be used, was about 2lbs.

16. Next day, the 5th of August, the apparatus was tested as before, but with this difference, the mean temperature of the water used for cooling was only 72° . This temperature was arrived at by leaving $9\frac{1}{2}$ gallons of the cooled water in the water-cylinder and filling it up with fresh water at a temperature of 82° . The results were, that in $1\frac{1}{2}$ hours, the heat decreased 4° ; in 7 hours, 5° ; in 12 hours 16° , and the greatest decrease reached was 24° . The mean decrease in a $22\frac{1}{2}$ hours' trial was 14° ; the heat of the water at the end of the trial being still 10° below the mean temperature of the water used for cooling. The ice used was in two large lumps and broken pieces as before; 6lbs. of the ice melted in seven hours, and in twelve hours it was all gone as on the previous day. After the water had been eleven hours without ice, its heat was found to be 10° below the heat of the water used for cooling. It will, therefore,

Results. be seen that the cooling power of the ice was not much influenced by the cooler temperature of the water used. For although the heat of the water on the first day declined 29° , and on the second day 24° , the actual temperature was lower on the second, than on the first day by 7° . Again, although the average decrease in temperature on the first day was 18° , and on the second but 14 degrees, the actual temperature was 8 degrees cooler on the second than on the first day.

17. On the two next days (6th and 7th August) experiments were made with broken ice. On the 6th one pint of a freezing mixture of five parts sal ammoniac, five parts nitre, and sixteen parts water, was used with the ice, it failed altogether. On the 7th, 4lbs. of common salt were added to the ice. The results of the experiments were as follows. On the 6th, in one hour the heat of the water decreased 3 degrees; in $5\frac{1}{2}$ hours 11 degrees; in $17\frac{1}{2}$ hours 12 degrees; in $21\frac{1}{2}$ hours, 8 degrees, while the greatest decrease reached was 20 degrees, and the mean decrease 13 degrees. On the 7th in two and a half hours the heat of the water decreased 12 degrees, which was the greatest decrease reached, while the mean decrease was 8 degrees. The average temper-

ature of the water used for cooling was on the 6th, 74 degrees, and on the 7th, 70 degrees. It will thus be seen that

Results. the water was cooled much more rapidly than when the ice was in two large lumps, but that the broken ice reached its greatest cooling power very quickly, and that it could not reduce the heat of the water to anything like as cool a temperature as the lump ice.

18. Again, the lump ice has another advantage over broken ice. It will be found by referring to Table 12 at the end of this report, that, when the ice is in two lumps, the heat of the water increases, after the ice has all melted, at a rate of something under half a degree per hour, and that the ice lasts about thirteen hours; when it is in three lumps, the heat increases at a little over half a degree per hour, and the ice lasts about thirteen hours; when in four lumps, at still something over half a degree per hour, while the ice lasts but twelve hours; when in five lumps at $\frac{3}{4}$ degree per hour, while it lasts but ten hours; and when it is broken up, the heat increases at one degree per hour, while the ice lasts only six and a half hours. So that at the end, let us say, of twenty-four hours, even supposing that the cooling powers of two lumps of ice, and broken ice are equal, the heat of the water would be fourteen degrees greater if the latter instead of the former kind of ice were used. However both methods of cooling water were found to be useful for special purposes.

19. It may be remarked, that the temperatures to which the water was reduced, were not very cold; that the water cooled in the apparatus, compared with ordinary ice water. temperatures of 66 degrees, 58 degrees, 61 degrees and 62 degrees are not such as iced water could be expected to reach. It was therefore determined to test the heat of ordinary iced water in pint glasses (soda water tumblers). The usual quantity of ice used for cooling water in a glass, is only quarter pound, half pound, three quarter pound, or one pound being seldom employed. By Table 4 it will be seen that quarter pound ice will last about eight minutes in a pint of water at 82 degrees temperature; that, in that time it will reduce that temperature to 65 degrees, that after thirty-five minutes, the heat of the water will reach 74 degrees, and that its average heat will be 71 degrees during the thirty-five minutes. Again, it will be found that half pound ice will reduce the heat of the water to 51 degrees in eight minutes; that it will last sixteen minutes, after which time the heat of the water will be 54 degrees; and that the water will reach a heat of 66 degrees in thirty-five minutes, while its average heat will reach 56 degrees. When one pound of ice is employed, broken into two lumps, it will last thirty-five minutes, and the temperature of the water will vary from 44 degrees after eight minutes; to 54 degrees, after 25 minutes; so that its average temperature will be 47 degrees. It will thus be seen that the averages, 66 degrees, 58 degrees, 61 degrees and 62 degrees are fair averages for ordinary iced water.

20. The apparatus, being now removed to the Coffee Shop, was tried on the 8th and 9th August, to see how the men took to the water, after the nature of the apparatus was generally understood by them. The men take to the water.

On the 8th 104 glasses (half pints) were drawn from the apparatus, and on the 9th 80 glasses. This latter day was a Sunday, and as the Coffee Shop was closed from 10 A. M. till 4 P. M. the quantity of water drawn away was naturally affected by it. This result was sufficiently encouraging to justify the continuation of the trials.

21. By the term "length of trial" is meant the length of time that elapsed between the putting in of the ice into the ice-cylinder and the taking out of the thermometers out of the water compartment; at which latter time the apparatus was cleaned. Meaning of terms "length of trial" and "between trials."

The term "between trials" is used to signify the time that elapsed between the taking out of the thermometers after a trial, to the putting in of the ice for the next trial.

22. It became probable, that if the men drank so much of the water on the first days of the experiments, that they would drink the apparatus dry as soon as they became more familiar with its advantages. Method of keeping the water cool.

It was evident, then, that some means must be arrived at by which a greater quantity than twelve gallons (its full capacity) should be supplied to them, and at the same time kept as cool as before. It was determined therefore that the water should be first thoroughly cooled, and then that fresh water should be added as required, while a fresh quantity of ice should be used to keep it sufficiently cool for the next 24 hours. With this object in view, on the 10th August, 30lbs. of ice were employed; 15lbs. being used first in a crushed state with 2lbs. of common salt added. This rapidly reduced the temperature of the water; the reduction being 11 degrees in $2\frac{1}{2}$ hours, and 17 degrees in $7\frac{1}{2}$ hours; at which temperature, after $11\frac{1}{2}$ hours, fresh water ($4\frac{1}{2}$ gallons at 80 degrees) was added, with 15lbs. of ice in 5 lumps. After $14\frac{1}{2}$ hours the temperature of the water in the water compartment was 11 degrees below the average temperature of the water employed, and after 22 hours was still 8 degrees below it. So far the experiment was successful. That the above precautions were not unnecessary will be proved by the fact that on the 14th 296 glasses ($18\frac{1}{2}$ gallons,) on the 16th 200 glasses ($12\frac{1}{2}$ gallons), and on the 17th 248 glasses ($15\frac{1}{4}$ gallons) were drawn off.

23. A great advantage of thus using the apparatus was incidentally discovered. It will be seen by Table 7, that only $10\frac{1}{2}$ gallons of water were drawn off on the 10th August, so that, had no fresh water been added, $1\frac{1}{2}$ gallons would still have remained over; but the addition of $4\frac{1}{2}$ gallons of water on the previous evening permitted of 6 gallons of cooled water remaining in the morning instead of only $1\frac{1}{2}$ gallons. Advantage of the above method.

It was then found that the addition of only $3\frac{1}{2}$ gallons of fresh water (instead of 8 gallons which would otherwise have been necessary) was required, to make the water last until the usual time for the putting in of the fresh ice arrived. By this means, the expense incurred on the day before by cooling the water, previous to the usual time for the putting in of the ice, was avoided. In order to avoid this expense with greater certainty, the water compartment was filled up to its full capacity every evening about 10 P. M., so as to leave as large a quantity of cooled water as possible in the morning. The ice was usually put in at about 5 P. M., for reasons stated below (see paras. 24, 25, and 26.)

24. The average temperatures of 67 degrees, 65 degrees, 57 degrees, and 57 degrees, at which the water in the apparatus had been kept on 8th, 9th, 10th and 11th August, the first days of its trial in the Coffee Shop, were found to be too cold for the soldier's taste. They preferred the water at about 70 degrees, that is, about 12 degrees below the average heat of drinking water, which was, about 82 degrees. Therefore by putting the ice in in the evening the water was kept at its coolest temperature during the night, and by the time that the men could use it in the morning, its heat rose on the average to about 68 degrees, rising again during the day to about 74 degrees before fresh ice was used.

25. Fresh water was never added in large quantities, except when the apparatus was filled up for the night. By adding only 3 or 4 gallons of water at a high temperature to a much larger quantity at a much lower temperature, the heat of the water was not much affected. It is better therefore, for the purpose of keeping the drinking water always cool, to add constantly small quantities of water, than to let the cooled water run nearly out and then add a large quantity of fresh water.

26. For the above reasons, then, the course pursued in trying the apparatus was as follows: 15lbs. of fresh ice were used every evening at about 5 or 6 P. M., and about an hour afterwards, 3 or 4 gallons of fresh water were added with 3 or 4 gallons more at a time, at intervals, afterwards if required; the apparatus being always filled up to its full capacity at night. No more water was added until the next evening unless absolutely required, and then only in small quantities at a time. By these means only 15lbs. of ice were required per diem to keep the water at a sufficiently low temperature.

27. As the apparatus is now made, it is very difficult to tell how much water there is in it at any given time, without taking out the ice-cylinder. This inability to tell the quantity of water left in the apparatus when it is necessary to know it, for the purpose of adding fresh water, makes it impossible to know exactly when to add, say a gallon, to fill the apparatus. But since the smaller

the quantity of fresh water added at a time is, the easier it becomes to keep the water at an uniform temperature, therefore it is highly desirable that some gauge be employed to measure the quantity of water in the water cylinder at any time. For this purpose I would suggest, that a strong, hollow, glass tube, of the same length as the water compartment, with a valve opening inwards placed at the bottom, (the top being left open) and having the distances representing the various number of gallons marked off upon it, be used. This tube should be provided with a handle, by which it could be moved up and down through a hole in the top of the apparatus (*vide* Fig. III.) Whenever the tube is let down into the water the valve at the bottom opens, and lets in the water, to the level of the water in the cylinder. Again, when the tube is lifted out, the pressure of the water in the tube shuts the valve, and so the water in the tube is kept up to its previous level. As the height of the water cylinder is 20 inches, and its capacity 12 gallons, therefore $\frac{13}{20}$ inches, *i. e.* $\frac{3}{5}$ inches on the tube would represent a gallon of water. With a gauge such as this the apparatus could be constantly kept full with very little trouble.

28. A funnel has been made by means of which water can be poured into the apparatus from a chattie if required (See Fig. VI.)

Funnels for use with chatties.

29. The necessity of a gauge, such as that described in para. 27, may be further seen from the irregularity with which the men drew off the water. It was quite impossible to ascertain certainly when a given quantity of fresh water would be required. Taking any week at random, it will be found, by referring to Table 7, that in the week 21st to 27th August inclusive, the quantities drawn off on the successive days were as follows :—200, 94, 152, 208, 168, 192, and 112 glasses. During the next week from the 28th August to 3rd September inclusive, the difference from day to day in the quantity of water drunk was just as great, *viz.* 128, 78, 56, 208, 96, 120, and 136 glasses.

Further reasons for the use of the gauge described in para. 27.

30. The day of the week was found to affect the quantity of water drunk. On Saturdays and Sundays the smallest quantity, an average of 119 and 118 glasses respectively, was drawn away. The next smallest was on Thursdays, 143 glasses, the next on Tuesdays, 157 glasses, the next on Wednesdays, 161 glasses; the next on Fridays, 192 glasses, and the greatest on Mondays, 197 glasses. On Sundays the Coffee Shop was closed from 10 A. M. till 4 P. M., so that no water could be drawn off during the day. On Saturdays, many men are usually on pass. Thursday again is a garrison holiday, and there is no evening roll call parade, which would account for the absence of many of the men. Fridays and Mondays, when the demand for cold water was greatest, are the days after the principal pass days; and from the known habits of soldiers the thirst for cold water on these days is easily accounted for.

Average quantity of water drunk per diem.

Tuesdays and Wednesdays may be looked upon as intermediate days. The average number of glasses drunk per diem during four successive weeks, was 196, 155, 143 and 124 glasses, and the average number drunk per diem throughout the whole month was 157 glasses or nearly ten gallons of water.

31. The number of men in barracks was, during the month, on an average about 600. As the number of glasses drunk per diem was 157, it shows that one man in every four drank the water, allowing each man one glass per diem, or one in every eight allowing two glasses per man drinking.

Percentage of men drinking the water.

32. The men usually drank the water after 5 P. M. and before parade in the mornings; very little being drunk in the day time, as may be seen by referring to Table 7.

The time when water was drunk.

33. It must be remembered that the men had to come out of their way to the Coffee Shop to drink the water, as it stands away from the barracks. A fact that will account for a far smaller quantity being drunk than would have been the case had the apparatus been placed in a more handy position.

Disadvantageous position of the coffee shop.

34. Let us now consider the cost of thus cooling the water. It will be seen by turning to Table 13, that, putting the cost of the ice at something under $1\frac{1}{2}$ as. per lb. (the cost per lb. at the Tudor Ice Company's House in Madras is $1\frac{1}{4}$ as., but with carriage it reached nearly $1\frac{1}{2}$ as. per lb. before it could be used), the cost per diem of 15lbs. of ice was 22 as., therefore the cost per glass varied from pies 0.83 to pies 4.71 in one day, the average cost per glass throughout the month being pies 1.61 or annas 4.05 for one glass per diem for a month of 30 days. So that were it found desirable to sell the water, if 200 men drank one glass per diem at a pie and a half per glass, or, what is the same thing, if 200 glasses were drunk every day at a pie and a half per glass, the apparatus would pay; that is, of course, if the ice cost $1\frac{1}{2}$ as. per lb.

The cost per glass of water, if the water were sold.

35. If it is thought desirable to supply the water gratis, it will cost Government rupees 43.75 per mensem if ice is at $1\frac{1}{2}$ as. per lb., therefore I think an allowance of rupees 50 per apparatus per mensem would be ample, and would leave a margin for the keep of men to look after them.

Cost to Government, per mensem, per apparatus, if water is supplied gratis.

36. With regard to the cleaning of the apparatus. It was found necessary to clean it every other day. This was done by pouring out the cooled water remaining in it into some receptacle, and after

Mode of cleaning the apparatus.

cleaning the apparatus thoroughly, pouring the water back into it. Thus none of the cooled water was lost.

37. It was found that the curiosity of the soldiers was too great to permit of them strictly obeying the injunctions, clearly written and placed near the apparatus, not to shake or meddle with it. In consequence of this disobedience the thermometers were so shaken on the 24th August, that it was quite impossible to read them ; and on the 25th August the maximum thermometer was found to have been broken. This could only have resulted from violent usage. Again, on the 3rd September, both thermometers (a new maximum having been used to replace the broken one,) were found to have been much shaken and unreadable ; and on the 7th September the minimum was broken. This second breakage put a sudden stop to the experiments. Also, on the 3rd September, it appeared that the ice-cylinder had been tampered with, for although the usual quantity, 15lbs., of ice had been put into it in four pieces, it was all gone in two hours without any adequate reason. Therefore it would seem to be desirable, that the apparatus should be kept fixed in some place near a wall, so as not to be easily shaken, and that the top should not be loose, as it is now, but that it should be fastened to the apparatus by means of a hinge and padlock, or by means of two padlocks placed opposite each of them.

38. The double quantities of ice (30lbs.) used on the 10th and 17th August are thus accounted for. The extra quantities of ice used on the 10th and 17th August and on the 4th September accounted for. The 10th was the day on which the system above explained in para. 22 was commenced. On the 17th it was found that the water supplied to the filters by the puccallies was not wholesome.

All the water in the apparatus was therefore thrown away, and the whole system of cooling commenced again from the beginning. On the 3rd September, as above explained in para. 37, the ice-cylinder was found to have been tampered with, and consequently that the water had not been properly cooled ; therefore, on the 4th, 6lbs. of crushed ice were put in in the morning in addition to the usual 15lbs. in the evening, in order to bring the water to the requisite coolness.

39. Having thus detailed the history of the experiments and the conclusions arrived at from the facts elicited, I would make the following remarks :—

Concluding.

(a) The proper system for cooling the water is to put in 15lbs. of crushed ice, early in the morning of the first day ; to add 15lbs. of ice, in as few pieces as possible, at about 4 P.M. ; to add not more than a gallon at a time of fresh water, when required during the evening, after the ice has been put in, say, at least one hour ; to fill up the apparatus at about 9 or 10 P.M. daily, and then unless it is absolutely necessary, to add no more water until the next day after the ice has been put in.

(b) The apparatus should be cleaned daily, or at least every other day.

(c) The water employed for cooling, should be the ordinary filtered water supplied to the men.

(d) Gauges, such as the one above described in para. 27, should be added to the apparatus.

(e) The tops should be fastened on in the manner described in para. 37.

(f) Funnels, such as that described in Fig. VI, should be used.

(g) The apparatus should be fixed in some convenient place in the barracks, where it could not be easily injured.

(h) Some trustworthy men should be paid to look after the apparatus.

I am of opinion that, from the attached tables to this report, it will be seen that the apparatus fulfils the objects for which it was intended, in so far that it really cools the water, and keeps it down to a reasonable temperature for a considerable length of time, at a very small cost. And finally, in proof of its popularity amongst the men, I may say, that during the month in which the above experiments were made, the sale in the Coffee-Shop of ginger beer, the usual substitute, in default of stronger liquor, was considerably diminished.

(Signed) R. C. TEMPLE, LIEUT.,

1-21st Fusiliers.

FORT ST. GEORGE, MADRAS,

3rd October 1874.

A D D E N D A.

No. 1.

It appears that the felt and blankets surrounding the apparatus become soaked through in the course of time, from the sweating of the cooled water through the outside of the apparatus. It does not appear probable that the blankets would last longer than six months, if as long. Provision must therefore be made for the supply of fresh blankets, the cost would not be great.

No. 2.

As the ice-cylinder, when empty, floats in the water, when it is pressed down in the apparatus by the closing of the top, it takes up a position somewhat like that in Fig. IV. It will therefore be necessary to keep it always in a vertical position by some such method as that explained in Fig. V. if the gauge is to be used, otherwise the gauge will be liable to be broken. The gauge itself must be fixed in a similar manner. I do not think it advisable to ensure the ice-cylinder being kept vertical by heavily weighting it, by adding lead or any other material to the bottom of it, as that method would greatly increase the total weight of the apparatus, and consequently the cost of the carriage of it.

TABLE No. I.

Showing the Atmospheric Temperature, the temperature of the water in the apparatus, and the temperature of the water used for cooling.

Date. 1874.		No. of hours during which the apparatus was on trial	Atmospheric temperature in degrees.			Temperature of water in the apparatus in degrees.			Temperature of water used for cooling in degrees.		
			Max.	Min.	Mean.	Max.	Min.	Mean.	Max.	Min.	Mean.
August	4	21	90	88	89	78	55	66	87	81	84
"	5	22 $\frac{1}{2}$	86	80	83	68	48	58	82	71	72
"	6	17 $\frac{1}{2}$	88	84	86	68	54	61	80	68	74
"	7	18	89	84	87	66	58	62	81	66	70
"	8	21	88	80	84	78	56	67	82	82	82
"	9	22	86	80	83	71	60	65	82	68	80
"	10	22	88	80	84	67	48	57	80	72	77
"	11	20	89	80	84	66	48	57	80	72	77
"	12	21	88	79	83	79	59	69	82	76	79
"	13	22 $\frac{1}{2}$	88	81	84	79	68	73	82	72	79
"	14	22 $\frac{1}{2}$	89	80	84	79	68	73	82	76	79
"	15	20 $\frac{1}{2}$	90	81	86	76	68	72	82	74	79
"	16	24 $\frac{1}{2}$	90	87	88	78	58	68	86	70	76
"	17	24	90	79	85	77	56	61	82	80	81
"	18	17	85	80	83	69	51	63	80	72	76
"	19	15	86	80	83	71	61	66	80	73	77
"	20	15 $\frac{1}{2}$	89	80	85	68	55	62	78	72	75
"	21	19	88	82	85	73	58	65	80	72	76
"	22	13	86	81	83	79	68	73	82	72	76
"	23	18	88	82	85	77	59	68	80	74	76
"	24	19	87	81	84	...	...	...	82	76	80
"	25	14	82	82	82	...	64	...	82	76	80
"	26	19 $\frac{1}{2}$	89	81	85	74	62	68	82	76	80
"	27	18	87	81	84	73	59	65	80	74	77
"	28	19	87	79	83	73	68	71	80	76	78
"	29	16	86	81	83	71	60	65	80	74	77
"	30	14	87	80	83	72	58	65	80	74	75
"	31	23	87	78	82	72	60	66	80	74	78
Sept.	1	17	86	80	83	71	59	65	78	74	77
"	2	18	88	80	84	76	59	67	80	74	78
"	3	19	87	81	84	...	60	...	82	74	77
"	4	23	86	79	82	71	51	61	80	76	79
"	5	24	89	76	82	74	60	67	80	72	76
"	6	25	85	79	82	72	57	65	80	74	77
"	7	23	88	80	84	76	...	...	82	74	78

NOTE:—On the 24th August the apparatus was shaken and the thermometer inside it could not be read ; on the 25th August the maximum thermometer was found broken ; on the 3rd September the thermometers were again shaken and could not be read ; and on the 7th September the minimum thermometer was found broken.

TABLE NO. II.

Shewing the difference between the temperature of the ice-cylinder and that of the cooled water, at given hours, after the ice was put into the ice-cylinder.

Date. 1874	Hour after the ice-cylinder was filled.	Temperature of ice-cylinder in degrees.	Temperature of water in degrees.	Difference in degrees.	
August	4	2	54	76	22
"	5	1½	46	68	22
"	6	1	44	67	27
"	7	2½	34	58	24
"	8	2½	58	76	18
"	9	2	40	68	28
"	10	2½	36	66	30
"	11	2½	46	64	18
"	12	3	46	72	26
"	13	2	48	70	22
"	14	4	48	68	20
"	15	1½	51	...	...
"	16	4	44	70	26
"	17	3½	55	70	15
"	18	2	57	70	16
"	19	2	54	70	16
"	20	2½	42	66	24
"	21	3	48	70	22
"	22	3	50	70	20
"	23	4	50	68	18
"	24	3	40	72	32
"	25	2	50	70	20
"	26	2	50	70	20
"	27	2	54	68	14
"	28	2	54	70	16
"	29	2	50	68	18
"	30	2	50	70	20
"	31	2	50	70	20
September	1	3	48	68	20
"	2	3	50	70	20
"	3	2	54	66	12
"	4	8	44	70	26
"	5	4	46	70	24
"	6	3	40	68	28
"	7	3	50	68	18

TABLE No. III.

Shewing the difference between the temperature of ordinary drinking water and the average temperature of the cooled water.

Date. 1874.	Temperature of ordinary water in degrees.	Average tempe- rature of cooled water in degrees	Difference in degrees.	
August 4	87	66	21	
" 5	82	58	24	
" 6	80	61	19	
" 7	81	62	19	
" 8	82	67	15	
" 9	82	65	17	
" 10	80	57	23	
" 11	80	57	23	
" 12	82	57	23	
" 13	82	73	9	
" 14	82	73	9	
" 15	82	72	10	
" 16	86	68	18	
" 17	82	61	21	
" 18	80	63	17	
" 19	80	66	14	
" 20	78	62	16	
" 21	80	65	15	
" 22	82	73	9	
" 23	80	68	12	
" 24	82	...	...
" 25	86	...	...
" 26	82	68	14	
" 27	80	65	15	
" 28	80	71	9	
" 29	80	65	15	
" 30	80	65	15	
" 31	80	66	14	
September 1	78	65	13	
" 2	80	67	13	
" 3	82	...	...
" 4	80	61	19	
" 5	80	65	15	
" 6	80	67	13	
" 7	82	...	..

TABLE NO. IV.

Shewing the temperature of ordinary iced water in a pint glass
(soda water tumbler.)

No. of tumblers.	Quantity of ice used in lbs.	No. of pieces in which the ice was used	Heat of water, used for cooling in degrees.	No. of minutes the ice lasted.	Heat of water in degrees after 8 minutes.	Heat of water in degrees after 16 minutes.	Heat of water in degrees after 31 minutes.	Heat of water in degrees after 35 minutes.	Average heat of water in degrees, during 35 minutes.
A	1	2	82	35	44	46	50	54	48
B	$\frac{1}{2}$	2	82	31	46	47	54	58	51
C	$\frac{1}{2}$	1	82	16	51	54	62	66	58
D	$\frac{1}{4}$	1	78	8	65	72	73	74	71

TABLE NO. V.

Showing the quantity of water cooled, the surplus remaining after each trial, together with the heat of the surplus.

Date.	Quantity of water cooled, in Gallons.	Surplus, in Gallons.	Temperature of surplus, in degrees.	
1874.				
August 4	12	9 $\frac{3}{4}$	68	
" 5	12	9 $\frac{3}{4}$	62	
" 6	12	10	62	
" 7	12	10 $\frac{3}{4}$	66	
" 8	9	2 $\frac{1}{2}$	68	
" 9	12	7	72	
" 10	16 $\frac{1}{2}$	6	56	
" 11	14	5	68	
" 12	16 $\frac{1}{2}$	7	71	
" 13	20	10	71	
" 14	20	7 $\frac{1}{2}$	72	
" 15	18	8 $\frac{1}{2}$	70	
" 16	14 $\frac{1}{2}$	5	76	
" 17	25	11	67	
" 18	16	11	67	
" 19	14	10	68	
" 20	15	9 $\frac{1}{2}$	68	
" 21	16 $\frac{1}{2}$	9	70	
" 22	15	10 $\frac{1}{2}$	70	
" 23	16	8	72	
" 24	18	7	72	
" 25	18	9	72	
" 26	20	9	73	
" 27	14	9	73	
" 28	14	8	73	
" 29	13 $\frac{1}{2}$	9 $\frac{1}{2}$	71	
" 30	12 $\frac{1}{2}$	9 $\frac{1}{2}$	68	
" 31	15	6 $\frac{1}{2}$	72	
September 1	13	8	71	
" 2	13	8	72	
" 3	10	3	74	
" 4	16 $\frac{1}{2}$	8	70	
" 5	14	8	72	
" 6	15	8	72	
" 7	14	4	76	

TABLE No. VI.

Showing the quantities in which fresh water was supplied to the apparatus after the ice had been put into the ice-cylinder.

Date.		Detail of the successive quantities of fresh water added, in Gallons.	No. of Gallons of cooled water already in the apparatus.	Total No. of gallons of water supplied.	
1874.					
August	10	$3\frac{1}{2}$, 1, 3.	9	$16\frac{1}{2}$	
"	11	3, 2.	9	14	
"	12	5, $4\frac{1}{2}$.	7	$16\frac{1}{2}$	
"	13	3, 3, 3, 5.	6	20	
"	14	$3\frac{1}{2}$, 7, $5\frac{1}{2}$.	7	20	
"	15	$3\frac{1}{2}$, $3\frac{1}{2}$, 5.	6	18	
"	16	2, 2, 2.	$8\frac{1}{2}$	$14\frac{1}{2}$	
"	17	$3\frac{1}{2}$, $3\frac{1}{2}$, $3\frac{1}{2}$, 7.	7	25	
"	18	3, 4.	9	16	
"	19	$3\frac{1}{2}$, $6\frac{1}{2}$.	5	15	
"	20	$3\frac{1}{2}$, 8.	$3\frac{1}{2}$	15	
"	21	1, 3, 3, 6.	$3\frac{1}{2}$	$16\frac{1}{2}$	
"	22	$3\frac{1}{2}$, $5\frac{1}{2}$.	6	15	
"	23	$3\frac{1}{2}$, $3\frac{1}{2}$.	9	16	
"	24	$3\frac{1}{2}$, $3\frac{1}{2}$, 7.	4	18	
"	25	$3\frac{1}{2}$, $3\frac{1}{2}$, $3\frac{1}{2}$, 2.	$5\frac{1}{2}$	18	
"	26	3, 2, 7.	8	20	
"	27	$3\frac{1}{2}$, $3\frac{1}{2}$.	7	14	
"	28	$3\frac{1}{2}$, $3\frac{1}{2}$.	7	14	
"	29	$3\frac{1}{2}$, $3\frac{1}{2}$.	$6\frac{1}{2}$	$13\frac{1}{2}$	
"	30	$3\frac{1}{2}$.	9	$12\frac{1}{2}$	
"	31	$3\frac{1}{2}$, 6.	$5\frac{1}{2}$	15	
September	1	$3\frac{1}{2}$, 4.	$5\frac{1}{2}$	13	
"	2	$3\frac{1}{2}$, 4.	$5\frac{1}{2}$	13	
"	3	$3\frac{1}{2}$.	$6\frac{1}{2}$	10	
"	4	$3\frac{1}{2}$, $3\frac{1}{2}$, 7.	$2\frac{1}{2}$	$16\frac{1}{2}$	
"	5	$3\frac{1}{2}$, $3\frac{1}{2}$.	7	14	
"	6	$3\frac{1}{2}$, $3\frac{1}{2}$.	8	15	
"	7	$3\frac{1}{2}$, $3\frac{1}{2}$.	7	14	

TABLE No. VII.

Showing when, and in what quantities, the water was drunk.

Date.	Quantity of water, in glasses drunk during trial.	Quantity of water, in glasses drunk between trials.	Total quantity of water drunk, in glasses.	
1874.				
August 4	33	...	33	
" 5	33	...	33	
" 6	32	...	32	
" 7	17	...	17	
" 8	104	...	104	
" 9	80	...	80	
" 10	168	...	168	
" 11	144	8	152	
" 12	152	32	184	
" 13	160	16	176	
" 14	200	96	296	
" 15	168	32	200	
" 16	152	...	152	
" 17	224	24	248	
" 18	80	32	112	
" 19	54	96	150	
" 20	88	48	136	
" 21	104	96	200	
" 22	62	32	94	
" 23	128	24	152	
" 24	144	64	208	
" 25	144	24	168	
" 26	176	16	192	
" 27	80	32	112	
" 28	96	32	128	
" 29	54	24	78	
" 30	48	8	56	
" 31	144	64	208	
September 1	80	16	96	
" 2	80	40	120	
" 3	112	24	136	
" 4	136	8	144	
" 5	96	16	112	
" 6	112	...	112	
" 7	160	16	176	

NOTE.—On the 10th August $3\frac{1}{2}$ gallons of fresh water were added between the trials; on the 12th 7 gallons, and on the 17th $3\frac{1}{2}$ gallons.

TABLE No. VIII.

Showing the quantity of water drunk on particular days of the week.

Calender from 10th August to 7th September, inclusive.

Sundays	...	...	16	23	30	6	
Mondays	...	10	17	24	31	7	
Tuesdays	...	11	18	25	1	..	
Wednesdays	...	12	19	26	2	...	
Thursdays	...	13	20	27	3	...	
Fridays	...	14	21	28	4	...	
Saturdays	...	15	22	29	5	...	
		Quantity of water drunk on particular days of the week, in glasses.					
							Totals.
							Average.
Sundays	...	...	152	152	56	112	472
Mondays	...	168	248	208	208	176	1,008
Tuesdays	...	152	112	168	96	...	528
Wednesdays	...	184	150	192	120	...	646
Thursdays	...	176	150	112	136	...	574
Fridays	...	296	200	128	144	...	768
Saturdays	...	200	94	78	142	...	484
Total No. of glasses for the successive weeks,	...	1,176	1,106	1,038	872	...	4,192
Daily averages,	...	196	158	148	124	...	626

The grand total of the total column of the quantity of water drunk on the particular days of the week is 4568,—this gives a daily average of 158. The grand total of the average column of the quantity of water drunk on particular days of the week is 1117,—this gives a daily average of 159. Taking then the two daily averages thus arrived at with the daily average 153 and 156, shewn in the above table, a general daily average of 156 glasses per diem is arrived at.

TABLE No. IX.

Showing the rate at which the heat of the water decreased after the ice was used.

3	1	6A	8	3	24, 28, 6S	12	5	18	9	9½	20	5	13	3S	4	18	23
6	1	22	9	3	1S	11	5½	6A	12	9½	9	7	13	29	6	18	27, 28
6	2	4A, 18, 31	9	3½	20	8	6	14	11	10	13	8	13	23, 28	5	19	22, 3S
4	2	5A	11	3½	17	12	6½	6A	14	10½	9	9	13	30, 3S	6	19	21
5	2	30	5	4	30	5	7	5A	16	10½	8	10	13	25, 27	8	19	24
7	2	19	6	4	28	9	7	15	8	11	6A	22	13½	8	7	19½	26
8	2	9, 28	7	4	19, 5S	11	7	13	9	11	13	7	14	30	9	20½	15
9	2	13, 27, 29	8	4	23, 31	12	7½	8	14	11	16	8	14	25	8	21	12
10	2	25, 26	9	4	14	17	7½	10, 17	17	11½	10, 17	10	14	18, 24	15	21	17
11	2	14, 3S	10	4	2S	12	8	4A	8	12	22	11	14½	10	8	91½	6A
6	2½	8	11	4	3S	9	8	4S	9	12	1S	9	15	19	8	22½	13
9	2½	11	12	4	25, 26	15	8½	17	10	12	1S	7	15½	20	7	22½	14
11	2½	10	13	4	27	7	9	15	13	12	11	6	16	29	6	23	31
12	2½	7A	15	4	29	9	9	12	16	12	5A	6	17	1S	0	24	16
4	3	22	5	5	12	11	9	14	22	12	4A	19	17	18	5	24	5S
6	3	16, 21	8	5	24	17	9	11	11	13	19	13	17	4S	14	24	17
7	3	12	9	5	15, 1S	18	9	16	6	13	22	12	17½	6A	4	25	6S

NOTE. — A stands for August and S for September; all the other dates refer to August.

TABLE No. X.
Showing the length of time that the ice lasted.

Date.		The quantity of ice used, in lbs.	The No. of pieces of ice used.	The No. of hours in which half the ice melted.	The No. of hours in which two-thirds of the ice melted.	The No. of hours in which three quarters of the ice melted.	The No. of hours in which all the ice melted.
1874.							
August	4	15	2 <i>b</i>	...	...	8	12
"	5	15	2 <i>b</i>	7	...	...	12
"	6	15	<i>b</i>	...	...	...	5½
"	7	15	<i>b</i>	...	...	...	6½
"	8	15	2	...	7½	...	13½
"	9	15	4	...	...	9½	10½
"	10	30	5 <i>bb</i>	...	14½	20	...
"	11	15	4	...	...	...	9
"	12	15	2	...	...	9	...
"	13	15	2	...	...	11	...
"	14	15	4	...	...	9	...
"	15	15	3	9	...	...	...
"	16	15	2	...	...	...	13
"	17	30	4 <i>bb</i>	8½	...	...	24
"	18	15	4	...	...	...	14
"	19	15	2	...	...	...	13
"	20	15	2	...	...	...	9½
"	21	15	2	...	...	...	12
"	22	15	2	...	...	...	10
"	23	15	3	...	...	...	13
"	24	15	3	...	...	...	14
"	25	15	3	...	...	...	13
"	26	15	5	...	...	...	8
"	27	15	3	...	...	...	13
"	28	15	2	...	...	...	13
"	29	15	2	...	...	...	15
"	30	15	2	...	...	...	13
"	31	15	2	...	...	...	13
September	1	15	2	...	...	...	12
"	2	15	4	...	...	...	13
"	3	15	2	...	...	...	2
"	4	21	2 <i>bb</i>	...	...	...	23
"	5	15	2	...	...	...	13
"	6	15	2	...	...	...	12
"	7	15	2	...	...	...	12

NOTE.—On the 3rd September the ice had been tampered with ; *b* stands for broken pieces ; *bb* means broken into very small pieces. On the 6th August a freezing mixture was added to the ice ; on the 7th 4 lbs. of common salt, and on the 10th 2 lbs. of common salt.

TABLE NO. XI.

Showing the rate at which the heat of the water increased after the ice was melted.

The No. of degrees the water increased in heat.	The No. of hours it took to reach the above increase.	The date on which the above phenomena appeared.	
4	4	6A	
6	7	8	
6	9	16	
6	10	4A	
8	10	24	
4	11	29, 30, 3S, 5S	
5	11	19	
6	11	5A, 21, 25, 26, 28, 1S, 2S	
8	11	7A 31,	
12	11	6A	
6	11½	9	
4	12	20	
6	12	22	
6	13	23	
4	15	6S, 7S	
5	15	18	
6	17	8	
10	18	4S	

NOTE.—A stands for August and S for September; all the other dates refer to August.

TABLE No. XII.

Showing the rate per hour at which the heat of the water increases, after the ice is melted; and the number of hours that the ice lasts.

(a) When the ice is in 2 pieces.

Date.	Increase per hour, in degrees	No. of hours the ice lasted.	Date.	Increase per hour, in degrees.	No. of hours the ice lasted.	Date.	Increase per hour, in degrees.	No. of hours the ice lasted.	Average.	Increase per hour in degrees. No. of hours the ice lasted.
1874. Augt. 4	$\frac{3}{11}$	12	1874. Augt. 19	$\frac{5}{11}$	13	1874. Sept. 1	$\frac{6}{11}$	12	$\frac{1}{2}$	
" 5	$\frac{6}{11}$	14	" 20	$\frac{6}{11}$	9 $\frac{1}{2}$	" 5	$\frac{4}{11}$	13	$\frac{1}{3}$	
" 8	$\frac{1}{11}$	12 $\frac{1}{4}$	" 21	$\frac{6}{11}$	12	" 6	$\frac{4}{11}$	12		
" 16	$\frac{3}{11}$	13	" 22	$\frac{6}{13}$	10	" 7	$\frac{4}{13}$	12		

(b) When the ice is in 3 pieces.

Date.	Aug.	Sept.	Average.
	23	24	25
Increase per hour, in degrees.	$\frac{8}{17}$	$\frac{6}{11}$	$\frac{4}{11}$
No. of hours the ice lasted.	13	14	13
			13

(c) When the ice is in 4 pieces.

Date.	Aug.	Sept.	Average.
	9	8	
Increase per hour, in degrees.	$\frac{12}{23}$	$\frac{1}{11}$	$\frac{1}{2}$
No. of hours the ice lasted.	12	13	12

(d) When the ice is in 5 pieces

Date.	Aug.	Average.
	10	26
Increase per hour, in degrees.	$\frac{6}{11}$	$\frac{3}{4}$
No. of hours the ice lasted.	8	12
		10

(e) When the ice is broken up.

Date.	Aug.	Average.
	5	7
Increase per hour, in degrees.	$\frac{3}{11}$	$\frac{8}{17}$
No. of hours the ice lasted.	5 $\frac{1}{2}$	6 $\frac{1}{2}$
		7 $\frac{1}{2}$

TABLE NO. XIII.

Showing the cost, per glass, of cooled water, with regard to the cost of the ice used to cool it, at the daily rate of consumption.

Data.		Total No. of glasses drunk.	Total cost of ice in annas.	Cost per glass in pies.
1874.				
August	4	33	22	8-00
"	5	33	22	8-00
"	6	32	22	8-25
"	7	17	22	15-52
"	8	104	22	2-53
"	9	80	22	3-30
"	10	168	44	3-14
"	11	152	22	1-73
"	12	184	22	1-43
"	13	176	22	1-50
"	14	296	22	0-83
"	15	200	22	1-32
"	16	152	22	1-73
"	17	248	44	2-04
"	18	112	22	2-31
"	19	150	22	1-76
"	20	136	22	1-94
"	21	200	22	1-32
"	22	94	22	2-80
"	23	152	22	1-73
"	24	208	22	1-26
"	25	168	22	1-57
"	26	192	22	1-37
"	27	112	22	2-31
"	28	128	22	2-06
"	29	78	22	3-38
"	30	56	22	4-71
"	31	208	22	1-26
September	1	96	22	2-75
"	2	120	22	2-20
"	3	136	22	1-94
"	4	144	42	3-56
"	5	112	22	2-31
"	6	112	22	2-31
"	7	176	22	1-50

Hence it will appear that the average cost of one glass per day for a month of 30 days would be 4-05 annas ; and that the total cost of keeping one apparatus supplied with ice for a month of 30 days would be 42-75 rupees.

EXPLANATION OF DIAGRAMS

No. 1.—Outside view of the apparatus.

„ 2.—Vertical section.

- A Water cylinder or compartment.
- B Ice cylinder or compartment.
- C Stool for draining away water from the melting
- D Cock for drawing water from the apparatus.
- E Funnel for pouring water into the water cylinder.

„ 3.—Vertical section showing proposed gauge.

- A Water cylinder or compartment.
- B Ice cylinder or compartment.
- C Stool for draining water away from the melting
- D Cock for drawing water from the apparatus.
- E Funnel for pouring water into the apparatus.
- F Proposed gauge.
- G Valve at the bottom of gauge.

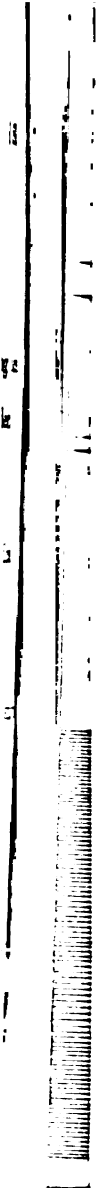
„ 4.—Vertical section showing position of ice cylinder when

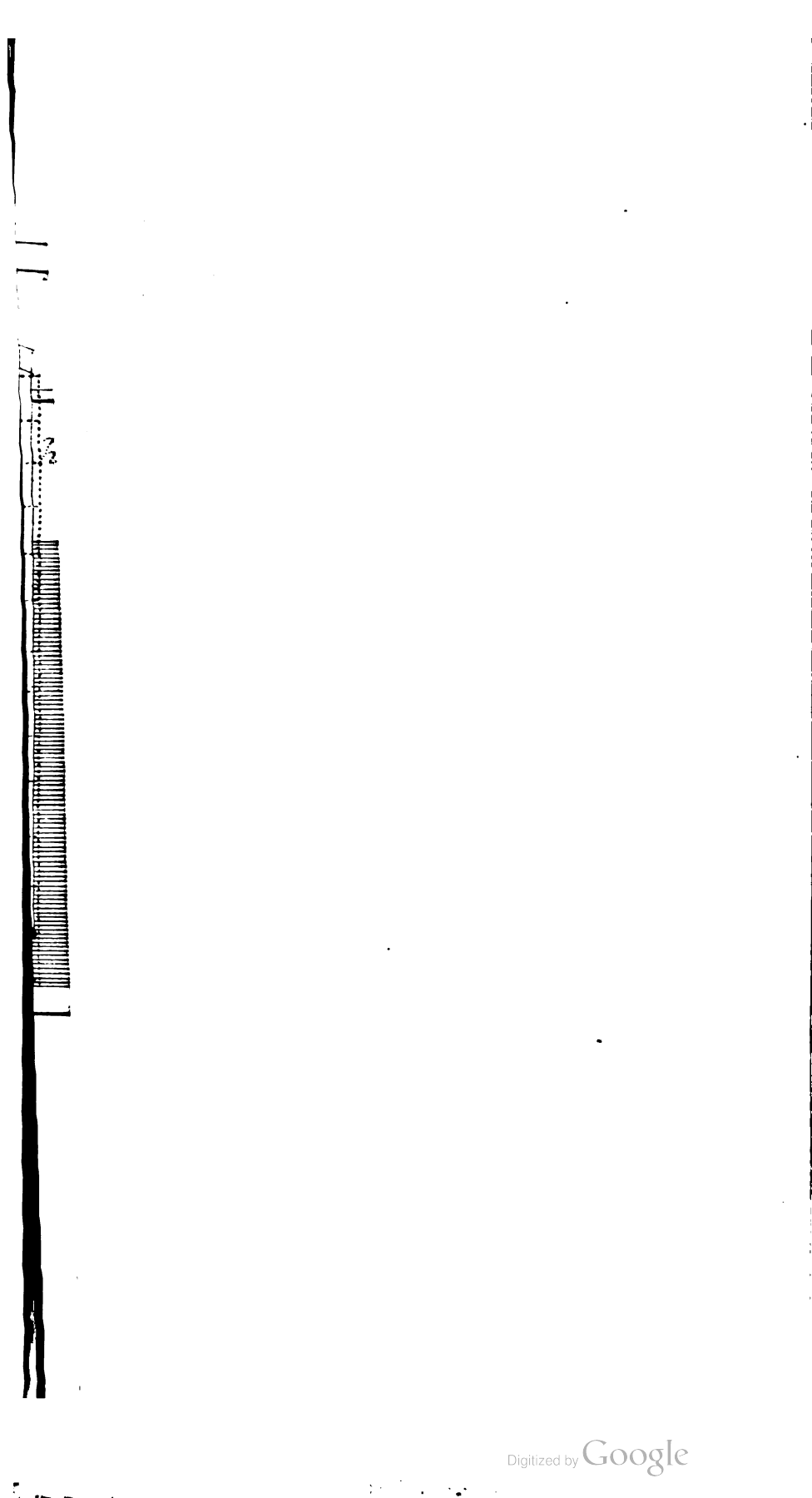
- A Water cylinder
- B Ice cylinder.
- C Stool.
- D Cock.
- E Funnel.
- F The broken gauge.
- G Valve at the bottom of gauge.

„ 5.—Vertical section showing proposed cylindrical wire
keep the ice cylinder and gauge in their proper

- | | |
|-------------------|--------------------|
| A Water cylinder. | F Gauge. |
| B Ice cylinder. | G Valve. |
| C Stool. | H The cage for ice |
| D Cock. | K Cage for gauge. |
| E Funnel. | |

„ 6.—Proposed Funnel for use with chatties.





II.

PROFESSOR ABEL'S GUN-COTTON AND WATER SHELLS.

Some two years ago Professor Abel submitted to the War Office a plan for "utilising the incompressibility of water, and its consequent power of instantaneously and completely transmitting force in all directions," in the bursting of 16-pounder and 9-in. shells. He stated that by this means the explosion of only a very small charge might be made to produce a decidedly superior effect, as regarded breaking up and dispersion, to that obtained by employing the full charge of gunpowder which the shell could contain. In support of his proposal he instanced a series of experiments which he carried out with spherical cast-iron shells containing water, and in which the bursting agents were in the form of small cylindrical charges of gun-cotton, into the centres of which were fixed detonators of fulminate of mercury, attached to the bases of the shell-plugs. The detonators were exploded by electricity in the Royal Laboratory bursting cell. Mr. Abel pointed out also that "the violence of the effects produced by the employment of finely divided gun-cotton, in admixture with water, as a bursting charge for heavy shells, far exceeds that of any other explosive agent yet tried." He considered that such an arrangement would quite remove the liability to premature explosion which had hitherto been found to occur when shells were filled with gun-cotton in the plaited, compressed, or granulated form, on their being subjected to the concussion produced by the discharge of the gun. In pursuance of this idea, the Committee on Explosives instituted a course of experimental trials to ascertain, firstly, "whether 16-pounder common shells when filled with water, will or will not break up in the gun when fired with 2½ lb. and 3 lb. charges;" secondly, "into how many pieces of sizes the shell will break when burst under different conditions," and thirdly, "whether 9-in. common shells, filled with water and paper pulp, will or will not break up in the gun, when fired with battering charges of pebble powder." Instead however, of following their investigations in regard to the two classes of projectile taken collectively, we will first enumerate the results arrived at with the 16-pounder shells, and afterwards allude to those obtained with the heavier shells of 9-in. calibre, thus separating our subject into two parts. The routine of experiments made was as follows, with reference to head No. 1 of the conditions sought for:—Ten rounds of 16-pounder common shell, which had previously been filled with water and plugged, were fired from a gun at Shoeburyness. None of them broke up, and eight were recovered in capital condition. This was eminently satisfactory. With a view of ascertaining point No. 2, eleven 16-pounder common shells were exploded in the bursting-cell at Woolwich, some of which had primers consisting of 1 oz. of gun-cotton enveloping a detonator containing 15 grains of fulminate, others a half oz. primer and similar detonator, the remainder being filled with gunpowder but having no primer. A portion of the shells with primers were filled with water. The result of exploding them was as follows:—Shells with 1 oz. primer of gun-cotton (with water) broke up into 300 pieces, shells with ½ oz. primer of gun-cotton

(with water) broke up into 165 pieces ; shells with $\frac{1}{2}$ oz. primer of gun-cotton (with water) broke up into 121 pieces ; shells with 1 oz. primer of gun-cotton (no water) broke up into 53 pieces ; shells with 1 lb. of gunpowder and no primer broke up into 32 pieces. Thus we observe that with 1 oz. of gun-cotton as a primer, the 16-pounder common shell filled with water broke up into 300 pieces, or nearly ten times as many fragments as were produced by the explosion of the ordinary bursting charge of gunpowder. It was also manifest that the presence of the water very greatly increased the shattering effect of the primer. On the same occasion some experiments were made with picric powder, both in lieu of gunpowder as an entire bursting charge, and as a primer in lieu of gun-cotton, in a shell filled with water, but the results were not so favourable as those obtained with gun-cotton and water.

The desired conditions in regard to the safety of exploding shells filled with water and the shattering power of a gun-cotton burster having been satisfactorily ascertained, it remained now only to be proved that a detonating arrangement or burster could be contrived for the 16-pounder shell which would be capable of bearing the very severe shock of discharge from the gun, all previous application of the detonators having been made, of course, under very different circumstances, viz. with the shells in a state of quiescence. In furtherance of this view a number of Royal Laboratory percussion fuzes, specially constructed, were prepared by having a copper tube or cylinder cramped on to a projection from the base. This cylinder was 3 in. long, and contained an ounce of dry compressed gun-cotton, a detonating cap consisting of 25 grains of fulminate of mercury being inserted in the top. Some of the fuzes were live, others dummy. The primers and fuzes being then fixed into 16 pounder shells, the whole were fired, the following experiments being tried with the two natures. In order to determine, in the first instance, whether the detonating arrangement would withstand the concussion of discharge, five dummy fuzes, fitted with gun-cotton bursters, and applied to shells filled with water, were fired with 3 lb. charges, the following being the result. The burster in every case was a good deal injured by the shock, and in some instances it separated from the fuze altogether. In order, secondly, to ascertain whether the fuze and detonator would act properly on graze, ten rounds with live fuzes and gun-cotton bursters were fired, the shells being filled with water. The following results were obtained. In the majority of cases the shells burst properly on graze, but two were blind owing to the primer or burster breaking away as in the experiments with blind fuzes. One shell burst prematurely in the bore of the gun ; such a contingency might easily, however, have been anticipated, for the weakness of the detonator would render its premature explosion extremely likely. The result of these experimental trials proved conclusively that some alteration must be made in the nature of the material employed for the construction of the burster, as well as in the means of attachment of the same to the fuze.

Such appearing to be the only difficulty, a number of strengthened

bursting were manufactured, the material of which was steel. They were contrived with a thread on the top so as to screw into the fuze-hole of a 16-pounder shell beneath the Royal Laboratory percussion fuze. Thirteen 16-pounder shells so fitted were fired at Shoeburyness with 3lb. charges. Eight of them were filled with water and had live fuzes. Seven of these burst with the greatest precision. One of them was blind, but this defect had nothing to do with the burster, as the latter was found afterwards uninjured in the blind shell. Two others similar to the first eight shells were fired but without water. They acted admirably, only burst into fewer pieces. Three shells fitted with steel bursters, but having no fuzes, fired with 3 lb. charges, retained their bursters uninjured.

Finally, in order to ascertain with certainty that the shells with improved steel bursters would break up well and produce a good cone of dispersion, four were exploded in the bursting cell at Woolwich, two of which had 1 oz. primers and two $\frac{1}{2}$ oz. primers. Both descriptions gave the best possible results, producing nearly 300 and 200 fragments respectively. This exhaustive series of trials having proved, beyond a doubt, the great value of the idea proposed by Professor Abel, and a burster for the 16-pounder having been produced which met all the requirements demanded of it, the Committee on Explosives recorded the following as their opinion :—

“That shells filled with water, and containing a small bursting charge of dry gun-cotton, could be safely fired from field guns.

“That with 1 oz. or $\frac{1}{2}$ oz. bursters of gun-cotton and detonators containing 15 grains of fulminate of mercury, the 16-pounder common shell filled with water would burst far more effectually than under ordinary circumstances when filled with powder.”

Our subject has already extended itself to such a length that we find it impossible within the compass of our present space to dwell upon the results obtained with the explosion of 9 in. shells under various conditions ; this and general remarks upon the prospective advantages offered by the introduction of Professor Abel's system, we propose to consider in another article.—*Engineer*.

In our last impression we discussed some of the results which were obtained by bursting 16-pounder common shells filled with water through the agency of a detonator consisting of fulminate of mercury and dry gun-cotton. One very important point, however, we omitted to touch upon and that is, whether 16-pounder common shells, charged as above, will prove more effectual against troops than they would with the ordinary bursting charge of powder. In order to obtain information upon this head thirty-six rounds of shell were fired against a number of targets, the nearest of which was 800 yards off. The percussion fuzes were exploded by a screen placed in front of the first row of targets. Some of these shells were charged with water and $\frac{1}{2}$ oz. of gun-cotton

in a gun-metal burster ; others with water and $\frac{1}{2}$ oz. of gun-cotton in a gun metal burster ; others with 1 oz. of gun cotton in a steel burster but no water ; the remainder were filled with gunpowder in the ordinary manner. The following table gives the mean result of the practice upon infantry and cavalry painted on the targets :—

Shells filled with	Hits per round.		Disabled per round.	
	On all targets.	On first row.	Cavalry.	Infantry.
Water and $\frac{1}{2}$ oz. of gun-cotton in gun-metal burster	95	67	25	31
Water and $\frac{1}{2}$ oz. of gun-cotton in gun-metal burster	90	64	26	32
1 oz. of gun-cotton and no water (steel burster) ..	63	41	20	22
1 lb. of gun-powder ...	18	12	7	7

It was thus manifest that a better effect was obtained with the "gun-cotton and water shell" than by any other of the arrangements adopted, but, singularly enough, that no advantage was gained by the employment of $\frac{1}{2}$ oz. of gun-cotton instead of $\frac{1}{4}$ oz. Hence it was resolved to adhere to the latter, as the size of the burster could be very materially reduced.

We now propose to go back to the place where we in our former paper separated the subject into two parts, and to take up the thread of the Explosive Committee's investigations as to the following point, describing also their subsequent proceedings consequent upon these investigations. The problem to be solved was this :—"Whether 9-in. common shells, filled with water and paper pulp, will or will not break up in the gun when fired with battering charges of pebble powder."

The object of employing paper pulp upon these occasions was to obtain a condition as nearly as possible assimilating to that of wet gun-cotton, in the consistence of the material used experimentally for filling the shells, it being ultimately intended to utilise wet gun-cotton for this purpose. It will be remembered that the danger hitherto experienced in the employment of gun-cotton in the compressed form as a bursting charge for shells had been obviated by the application of a recent discovery, which had established the fact that that explosive, when wetted, was perfectly innocuous until detonated by fulminate of mercury in close contact. With a view of solving the problem proposed, twenty rounds of 9-in. common shell, filled with paper pulp wetted to saturation, were fired from a gun at Shoeburyness, the ordinary battering charge of 50 lb. of pebble powder being employed. The result was that none of the shells broke up, and all were perfectly steady in flight.

The issue of these experimental trials being so entirely satisfactory, Professor Abel submitted a plan for a detonator and dry gun-cotton primer to be applied to the 9-in. common shell, in conjunction with a Pettman's percussion fuze, no modification of the latter being necessary. The bush of the shell is prolonged and tapped to receive a thread turned upon the top of the cylinder forming the primer, which is thus an extension of the fuze, precisely as that adapted to the 16-pounder shell. The proposed arrangement of Professor Abel's was not strictly adhered to in the experiments as will beⁿ seen presently, but will doubtless be ultimately adopted should the application of wet gun-cotton as a bursting charge be finally approved by the War Office authorities. The burster was $5\frac{1}{2}$ in. long and contained 672 grains of dry compressed gun-cotton. The detonating cap consisted as before of 25 grains of fulminate. In order to determine whether 9-in. shells fitted with these bursters would withstand the shock of discharge, several rounds were fired filled with water. The cylinders were crimped on to the bases of dummy Pettman's percussion fuzes. All exploded prematurely in the gun, thus plainly showing that the use of water in bursting 9-in. shells must never be contemplated. Similar shells were then filled with wet paper pulp, and the attachment of the burster being slightly modified, several rounds were fired with the most perfect success. It is true that the cylinders were in some instances bent, but a slight thickening of the material employed in their construction would obviate such a difficulty.

This point being also satisfactorily decided, it only remained to ascertain the effects that would be produced as to breaking up and dispersion by the exploding of 9-in. shell fitted with such bursters, but having the paper pulp replaced by wet compressed gun-cotton. Accordingly, a boarded enclosure was contrived upon the sands at Shoeburyness within which several of these projectiles, packed as tightly as possible with lumps of wet gun-cotton, and fitted with the burster before described, but having merely a plug screwed into the fuze-hole above it, were fired by means of an ordinary electric fuze through a hole in the plug. Some 10 lb. or 12 lb. of gun-cotton were packed into each shell. The result was marvellous. The shells burst literally into thousands of pieces, some portions being propelled to a distance almost in the condition of powder! It was, indeed, nearly impossible to count the fragments. In short, the effects produced by these experiments far exceeded the most sanguine anticipations of the Committee on explosives.

It appears almost superfluous to make any comment upon the success of Professor Abel's proposal, so far as regards the results obtained with the 16-pounder common shells charged with a gun-cotton detonator and filled with water. Indeed the conditions observed by the Committee on explosives in experimenting with them clearly point to the following conclusion, viz :—That in actual warfare against troops their effect would be considerably more disastrous than that of 16-pounder common shell charged in the ordinary manner, the number of fragments produced being far greater, and the cone of dispersion of those fragments being

quite as efficacious. We limit this opinion, advisedly, to the probable effects "against troops," for against buildings, palisades, or earthworks, these projectiles would of course be useless, the minuteness of the fragments rendering them, under such circumstances, innocuous. Moreover, we say nothing as to the comparative advantages of 16-pounder shrapnel, and the gun-cotton and water shells, for no pattern of the former has hitherto been constructed which can be considered as a serviceable projectile, a large proportion of those employed having broken up prematurely in the bore of the gun. It is possible, however, that a well-constructed shrapnel shell might prove to be in its destructive powers a formidable opponent of the projectile now under consideration. But under any circumstances, Professor Abel's plan possesses the merit of great ingenuity and qualifications of the highest value in projectiles for field service, and we sincerely hope that his activity in elucidating the valuable properties of the gun-cotton and water system will not be rewarded by the disappointment of seeing his invention taken up by some continental Power, instead of by his own country, owing to the conservative tenacity of the scientific branches of our army in adhering to the several classes of projectiles now extant.

The successful results obtained by bursting 9-in. common shells filled with wet compressed gun-cotton, through the agency of a small dry gun-cotton detonator, lead us also to the conclusion that such an arrangement would tell fearfully in the bursting of a shell amongst a ship's crew, or in resisting a boat attack upon fortresses. No 9-in. shells filled with gun-cotton have been as yet submitted to the test of being actually fired against targets, with a view of determining the amount of hits which would be made, and the consequent number of casualties, but there is no reason to doubt, from premises already arrived at, that they would bear the shock of discharge, and that the cone of dispersion of the fragments would have proportionately as telling an effect upon surrounding objects as that of the 16-pounder shell.—*The Engineer*.

III.

ON THE ORGANIZATION OF AN INTELLIGENCE
DEPARTMENT.

THE advisability of collecting beforehand as much information as possible regarding the country in which a campaign is anticipated, of noting the forces of the enemy and strength of his positions, of using every endeavour to obtain the earliest news respecting his movements, and to fathom his intentions, has been always recognized ; and the employment of spies, though perhaps not openly acknowledged, is a universal and an old custom. There has seldom, perhaps, been waged a successful war where such obvious precautions have been neglected, or, if successful, it will be found to have been so only after a needless waste of life, and after unnecessary difficulties and delays ; to obtain before, and during a campaign, the fullest and most accurate intelligence that is to be procured is avowedly one of the first steps towards ensuring eventual success. Were we always certain of a year's or even a few month's notice before the outbreak of a war we might perhaps safely jog along as hitherto, collecting the information required whilst making our preparations for battle ; but the suddenness with which great Continental wars have broken out in recent times, and the rapidity with which they have been decided, shew that this policy is no longer safe, and that to avoid the chance of confusion and mistakes we must collect and tabulate in time of peace, in order that we may know where to lay our hands on the notes on any particular subject when war is declared, and though this is not so much the case in Asiatic wars, yet we must remember that it is easy to recall instances in which want of information has been one of our greatest difficulties, *e. g.* in our occupation of Kabul ; besides, a war on the continent of Europe is not unlikely to affect the equilibrium of Asia ; the shock of a campaign on the Danube would be felt from the Trigris and the Lebanon to Herat and Turkistan, and Indian armies might have to encounter more energetic and better prepared enemies than any they have hitherto engaged. At all events what is worth doing at all is worth doing well, and more especially in the conduct of a war, where a slight mistake may mean disaster. The haphazard system, or want of system, hitherto prevailing, cannot be upheld, even when we have only to contend against an inferior foe, in comparison with a settled system such as has been elaborated by the staff in Berlin.

There the topography and the armaments, the resources as regards supplies of all kinds, and every point of strength or of weakness, for offence or for defence, of every country with which Prussia could come in contact, are carefully registered, the gauges of the railways, the numbers of the engines and carriages available, and the suitability of the stations for the use of cavalry and artillery ; the accommodation of the harbours, and the tonnage of the steamers and sailing vessels belonging to them are recorded, and in fact everything which could possibly exercise any influence in the event of a conflict. To the immense advantage which Germany derived from this foresight in her recent campaigns much of her brilliant success is to be attributed, and, consequently, there

is hardly a nation in Europe which has not since, to some extent, followed her example. The machinery introduced into the Horse Guards to supply this want for the English army at home is probably as yet very imperfect, but still it is a great step in advance of the army in India, which has as yet no regularly organized Intelligence Department at all.

It is doubtful, perhaps, whether in this country there is any lack of general information regarding our neighbours and our own dependent territories, but this information, whether much or little, is scattered over the country in the notebooks, the journals, or more frequently perhaps in the memories of officers and civilians, so that it would not be obtainable at a day's or even a month's notice if required ; what we need is an organization for collecting, digesting, and systematically recording, in a readily accessible form, whatever has been observed by political officers, missionaries, sportsmen, or soldiers. Among British officers it may be presumed that there will be no insurmountable difficulty in obtaining a supply of the right sort of men to do the work which will be required. It would not be sufficient to obtain only linguists, able to study the published accounts of the resources of neighbouring countries, to read the correspondence which might be obtained, to converse with the inhabitants, and to estimate the sincerity of their descriptions; nor do we only want the scientific explorer who, from his knowledge of geology and kindred sciences, will choose the best positions as regards water supply, or who will make a survey of a new country ; nor would it be enough to secure men distinguished in that art, which seems often intuitive, of deciding at once upon the strategical and tactical value of roads and cities, rivers and defiles, and estimating at their true value, the strength of fortified positions. None of these qualities singly would produce all that is required for an efficient Intelligence Department, but our aim must be to obtain a combination of the whole, with a power of concentrating, digesting, and re-arranging all the information which may be acquired, in such a form that it may be easily accessible when needed. Such a combination of talents and acquirements may sometimes perhaps be found in one man, but generally an approximation to this ideal must content us, and perfection attained by so utilizing the varied abilities of different men as to produce in the whole Department the excellence which can hardly be looked for in one individual. Supposing, however, that the right men have been found, the next and by far the most important consideration is how to make the most of the information which they possess and will continue to acquire, in fact, how best to organize the Intelligence Department, and first, the principles which should guide us in this work must be admitted and clearly understood. They appear to be the following :—

1st. That we should not, without stringent necessity for so doing, add a new Department to those already existing, as a multiplication of independent or semi-independent organizations tends to cause delay and confusion. Also, when a proportion of the officers become disabled from any cause on service it is a hindrance to the work being readily distributed among those who remain.

2nd. It is impossible to give to any existing Department, without considerable changes in its organization, the additional work which must be entailed if the collecting, tabulating, and distributing of information is to be carried out on a proper scale.

3rd. The Department which collects and tabulates should also be entrusted with the conveyance of information in the field. It would be introducing absurd complications, and inviting delays and mistakes to entrust one Department with the duty of collecting information from the inhabitants of the country in front, and another with the duty of sending it, say across the Indus, by signalling, while the first Department would again intervene to receive the information, collate it with knowledge already acquired, and submit it to the chief of the staff. Nor, on the other hand, could the duty of collecting information on active service by reconnaissance and similar means, be separated from that of obtaining it from books and personal observation in time of peace ; any such attempt must result in contradictions and mistakes that might be disastrous. Next, if we examine the organization of the general staff of our army we find that it has always been divided into two branches, the Adjutant General's and the Quarter Master General's.

When the British army consisted, in time of peace, of two or three regiments of foot, and a few troops of Horse Guards, whose duties were almost confined to that of guard mounting at St. James's, and when the Adjutant General and the Quarter Master General, without Deputies or Assistants, constituted the whole of their respective Departments, this division of work was no doubt very suitable, but in the opinion of many, if not the majority of those officers of experience who have given their attention to the subject, it is not adapted to our present requirements ; the appointment of a chief of the staff in all our recent expeditions may be taken as an acknowledgment that, to some extent, an amalgamation is desirable.

The duties of the Adjutant General's Department being those generally brought under the head of staff duties, that is to say the assistance of the general officers in their work of supervising and directing the troops, no difficulty would arise, and no great changes become necessary so far if the two branches of the staff were amalgamated, but with the Quarter Master General and his officers the case would be very different. These latter have two classes of duties to perform, connected indeed to some extent (as indeed nearly all military duties are one with another), but capable of being easily separated. In the first place, the officers of this Department are charged with the duties of quartering, encamping, and moving the troops, with the control over issues of camp equipage, with all correspondence with the Engineer Department, and generally with everything relating in any way to the cantonment or camp ; in the second place they are expected to have a perfect knowledge of the roads, rivers, and natural features of the country, of the carrying powers of the railway, and of everything which bears upon the defensive or offensive capabilities of the garrison or district. The work comprised in the former of these sub-divisions comes naturally within the sphere of the general staff, and by the amalgamation of about one third of those

officers who are now employed in the Quarter Master General's Department with the present staff of the Adjutant General, this officer, as chief of the staff, would probably be able to dispose of these duties in addition to those which are already allotted to him. The Quarter Master General, with about two thirds of his staff, then remains as at least the nucleus of an Intelligence Department.

The question next arises what should be the organization of this new branch of our staff, so that it may best perform the two classes of duties with which it will be entrusted, viz :—

The collection and the transmission of Intelligence.—The former will comprise the work of ascertaining by travel and by reading during peace, the condition, physical aspects and resources of possible theatres for campaigns, and the prosecution of similar enquiries in time of war, by the use of spies and other stratagems ; the latter will include all arrangements for field posts, telegraphs, day and night signalling, &c. The making of reconnaissances seems to belong more properly to the first named of these classes, but it must always be closely connected with the second, and on this account, if for no other, both should be carried out by officers acting in concert under one head. Without going into pretended details of the actual number of officers required to carry out this scheme, details which must necessarily be worthless without the test of actual practice, it may be laid down that to the Quarter Master General of the army, with a sufficient staff of assistants, would fall the task of collating and compiling, so as to be readily accessible, all the information collected by his assistants, and of bringing it to the notice of the Commander-in-Chief, or of the General Officer Commanding an expeditionary force. In the field an Assistant Quarter Master General would be necessary with each Division, who would perform the same service for the Divisional General ; but in ordinary times, one officer of this rank to every group of three or four Divisions or Districts would be sufficient. Below this rank some division of duties seems necessary, and the simplest plan appears to be that of giving to every Assistant Quarter Master General in the field two Deputy Assistants, one for the charge of the telegraphs, signalling, and other such technical work, and the other for more general duties ; it is, however, evident that any such arrangements must depend almost entirely on the nature of the country and other circumstances, and that no hard and fast line could, or ought to be drawn. Telegraphy will no doubt play an important part in all future wars, but while in one country reconnaissances and visual signalling may be used with great advantage, in another we may have to depend chiefly on the services of spies ; in one district information may be carried regularly and safely by post, in another it may be possible to transmit it only by mounted orderlies, or relays of considerable bodies of cavalry. The rule, however, of giving two Deputy Assistants to each Division might hold good generally at Camps of Exercise ; one would arrange, and, as far as possible, superintend the carrying out of reconnaissances, collect the news gathered by patrols and out-lying pickets or spies, and if necessary, make abstracts of written Intelligence furnished from the Head Quarters of the Department ; the other would distribute the parties required for signalling, prescribe the lines for the field post and telegraph,

and generally superintend the transmission of Intelligence in every shape and by every means. To attempt to lay down rules for the guidance of those whose duty it would be to carry into practice the principles laid down in this essay would be a mistake, the impertinence of which would only be matched by its absurdity; in endeavouring to comply with the wish expressed by the council of this Institution it will amply suffice if the writer has succeeded in discovering and explaining the fundamental rules which should be followed in engrafting on the staff of the army its newest, but perhaps its most important branch, and those, as explained in the opening paragraphs of this article, appear to be : firstly, to add no new Department which would introduce useless correspondence and harmful delays; secondly, not to increase unduly the work required from our staff officers; and thirdly, to give to one set of men the control over all the operations requisite for the transmitting, as well as for the collecting and tabulating of Intelligence.

The writer would hope that he has indicated above the simplest method of attaining this end, a method which would be inexpensive and easy to carry into practice, which would give rise to no circuitous correspondence, which would produce an organization directly subject to the Officers Commanding Divisions and Brigades, a handmaid to assist them, and not an additional office to worry and confuse; which would, it is believed, require only to be carried out by efficient instruments to produce an Intelligence Department second to none in utility; and last, but by no means least, a method which would be in consonance with the customs and traditions of the service, and would introduce no new and perplexing military titles. The question of titles may appear to some of small importance, but it should not be forgotten that while officers of the Quarter Master General's Department would arouse no particular suspicion when travelling in foreign countries, any one who was designated as belonging to the Intelligence Department would everywhere be looked upon as little better than a spy. It will of course be essential in India that the local officer of the Intelligence Department (according to the above plan the Assistant Quarter Master General) shall be on good terms, and in constant communication with the civil and political authorities, and well acquainted with all the principal native chiefs and leaders. Such information as can be gathered from officers' letters, in reply to set questions, will not possess the same value as that which is to be acquired by travelling through a district with its Deputy Commissioner and Police Officers, by conversing with the native feudatories who keep the peace on the frontiers, or by spending a few days in the offices of the railway traffic managers. If, however, a simple and rational organization be introduced, and men to fill it be selected with care, there can be no fear that the work required will not be properly done. In conclusion it may be allowed to the humblest contributor to military literature to urge upon those in authority the necessity for losing no time in placing upon a sure footing the Department on which our Generals should be able to rely for that forewarning which is the necessary precursor to being forearmed; it is evidently a matter in which no more time should be lost, though equally one in which hasty schemes, result-

ing, as a matter of course, in imperfect and ill-arranged measures, are especially to be deprecated ; in this, as in other army reforms, our motto should be *festina leute*.

G. T. PLUNKETT, CAPT., R. E.

IV.

CAVALRY-PIONEERS, IN THE AUSTRO-HUNGARIAN ARMY.

(From the Revue Militaire de l'Etranger.)

I.

INTRODUCTORY.

Before the wars of 1866, Austria had already, in many of her Cavalry regiments a certain number of troopers (hussars, uhlans, or dragoons) instructed and equipped to perform the duties of Cavalry-Pioneers.

These troopers, formed into special sections in each of the six regiments of the light cavalry division of General Edelsheim, rendered during the campaign in Bohemia such good service, that it was then decided to confirm their title definitely, and the employment of them became general throughout the cavalry regiments of the Austro-Hungarian army.

The sections of regimental pioneers are recruited among the men of the regiment ; clothed, armed and equipped like their comrades, the pioneers only differ from them in having received a very simple training as excavators or carpenters (one might almost say woodmen). This training is only given to them when they have passed through the first class in riding drill, and by a special certificate permitting them to carry the tool belonging to one of the five categories of pioneers.

The end aimed at by General Edelsheim in creating this organization, which now dates from ten years since, was to render the cavalry independent, to enable it to fulfil by itself and without the assistance of the other arms, the various requirements of service as Advance-Guard, and to give to it the means of surmounting those obstacles which serve to arrest or retard its action. The companies of engineers are not so numerous, nor above all are they so rapid in movement, that it is possible to count always on their assistance, especially in improvised "coups-de-main," which are the speciality of cavalry, and thus it frequently happens that a contemptible obstacle suffices at times to delay the advance of a body of advanced scouts for several hours.

To give to the cavalry the means of dealing, on the march and in bivouac, with the numerous eventualities of service in the field, is to gain for it a freedom and security which largely develops its action in presence of the enemy. Thus, in the spirit of General Edelsheim's instructions, the pioneers of cavalry, whether they be hussars, uhlans, or dragoons, are always first and before all made into excellent horsemen, and can be used in the boldest reconnaissances ; and while they constitute a precious means of overcoming material obstacles, they do not cease to remain in the hands of their colonels, and do not diminish by one sabre the effective strength of the combatants.

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Eight years of experience have justified the prescience of General Edelsheim. A few months in the schools of the engineers were sufficient to give the necessary instruction to the cavalry officers charged with the command of the pioneers, who, on their part, quickly acquired the simple technical instruction special to their service, and the ties of fellowship which never ceased to exist between the troopers of the pioneer section and the other soldiers of the regiment always rendered it easy to supply gaps in the section, whether caused by fatigue or casualty, by volunteer labourers taken from the squadrons. Thus one cannot be surprised at the maintenance in Austria of the system of General Edelsheim, and the trials which have been instituted in other armies with a view to the adoption of one more or less complete.*

It may not therefore be quite profitless, as an example of the advantages gained by the employment in the field of cavalry-pioneers, to refer to the report addressed by General Edelsheim to the Emperor of Austria (2nd September 1866), which contains a short analysis of the principal cases where the pioneers of the Light Division have been employed during the Bohemian campaign. †

Defence of a village.—On the 26th June, a detachment of the 9th Hussars in retreat received orders to engage the enemy, and hold him in check at Langenbrück; the regimental pioneers constructed barricades which were brilliantly defended by dismounted hussars, until the arrival of the enemy's artillery compelled them to retire.

Formation of a road of approach.—On the 26th June, after the fight of Sichrow, General Appel's brigade was encamped on the left bank of the Iser, men and horses wearied with long marching. The bank was extremely steep and 30 feet high, and it would have been necessary to take the horses a long distance to water without the assistance of the pioneers of the 9th Hussars, who rapidly cut a ramp practicable for horses, and more than 120 yards in breadth.

* General Edelsheim's light cavalry division was composed as follows :—
1st Brigade (Colonel Appel).

2nd Dragoons.

9th Hussars.

One horse-battery of the 11th Regiment of Artillery.

2nd Brigade (Colonel Wallis).

1st Dragoons.

10th Hussars.

One horse-battery of the 11th Regiment of Artillery.

3rd Brigade (Major General Fraticsewicz).

5th Hussars.

8th Hussars.

One horse-battery 11th Regiment Artillery.

Each of these regiments was of six squadrons. The 4th sections of the 6th squadrons, equipped as pioneers, were of the strength of 40 men.

To this must be added the Squadron-Pioneers (Regimental-Pioneers) 5 per squadron. Each regiment thus possessed 65 men provided with tools, and the whole division 390 workmen.

† Trials in this direction have been instituted in Russia and Germany, as will be described hereafter. In France one cavalry regiment is testing a provisional system.

Road blocked by abattis.—The same day, the pioneer section of the 10th Hussars forming the rear-guard before the village of Gilloway on the Liebnau-Turnau road, blocked the road in two places by abattis of engineer sealed pattern, and rendered it for the time impassable by the enemy.

Destruction of two bridges.—On the 25th June, the pioneer-section of the 1st Dragoons, leaving Turnau, had to destroy two wooden bridges 40 yards long, built on the Iser; the first was saturated with resin and burnt, the second was taken to bits, and the baulks sawn up and abandoned to the current.

Formation of a causeway across a morass.—The same day the artillery of the division Edelsheim on arriving at Brexina near Münschengrätz, found its progress arrested by marshy ground; a section of pioneers immediately built, with wood from a fence, a species of solid framework, over which the batteries were able to pass.

Watering places.—On the 27th June, the troops arriving at the bivouacs of Duebach were short of water for the horses; the pioneers of the 9th Hussars succeeded in damming tiny streams so as to retain the water in sufficient quantity for the purpose.

Improvement of a cross road.—On the 28th June, Col. Wallis's brigade forming the rear guard and fighting in retreat, should have occupied the village of Samsin; this brigade charged with the protection of the artillery and the convoy of ammunition belonging to the division, found itself stopped by the narrowness and bad condition of the road from Duebach to Münschengrätz, and under the necessity of crossing a moss impracticable for wheeled carriages. The pioneers of both regiments of the brigade immediately set to work, those of the 10th Hussars were ordered to repair the road, those of the 1st Dragoons to construct a causeway of fascines; thanks to this labour rapidly executed the brigade effected its retreat in good order, and without being harassed.

Works to facilitate the employment of artillery.—On the 29th June, General Fracticsewicz's brigade was in position to the south-west of Jicin, across a hollow road which did not permit of the exit and deployment of horse artillery, the general gave the order to the pioneer-sections of the 5th and 8th Hussars to prepare passages suitable to the various phases the fight might assume.

Several ramps were cut in the banks, and a bridge built over a water-course parallel to the road; these precautions enabled the full power of the guns to be brought to bear on the enemy, on the instant that his approach became known.

Similar Works executed under Artillery Fire.—During the same affair, the light artillery of the division found its way obstructed by deep cuts and steep banks to the west of the road from Jicin to Turnau, at a time when its deployment in line had become indispensable to

support the troops of the 1st Corps, exposed without guns to a terrible fire from the enemy. The two pioneer-sections of the 5th and 8th Hussars dismounted under fire, and in 40 minutes constructed three small bridges of 12 to 24 feet span, which allowed the artillery to reach Rybrick in time to maintain the action.

The same day General Fraticsewics' brigade, retreating with the artillery of the division and sent to the succour of the 1st Corps, found Jicin so blocked up that they could not proceed; the two pioneer-sections at once built causeways over the large marshy ditches which border the road from Rybrick to Stacynysto, and enabled the artillery to retreat without loss of time.

Opening a practicable road for Artillery.—On the 30th June, during the retreat from Milciowcs to Smider, the road was so blocked by the wagons of the Saxon corps d'armée, that it was impossible to push forward the batteries of artillery without risking dangerous embarrassments. The order having been given to pass without delay, the column left the road to cut across fields, preceded by the pioneers of the 5th Hussars, who facilitated the passage over a length of more than a league from Milciowcs to Hoch-Wessely, by means of artificial roadways of fascines and faggots and several small bridges over several streams and ravines, and the battery of four guns crossed with the cavalry this intersected and marshy ground without leaving anything behind it.

Opening a passage through a palisaded enclosure.—On the 3rd July, during the battle of Königgrätz, Col. Wallis's brigade found the debouchure from a park closed by a strong barrier of palisades of large scantling; the pioneer-section of the 10th Hussars, attacked the palisade with axe and saw, and cutting a passage of 25 yards in breadth, saved the brigade the long detour which they must otherwise have made to find egress.

Clearing a passage through a wood for Artillery.—On the 6th July, General Fraticsewics' brigade in retreat from Klinska on Kramenicek, crossed a marshy forest where its artillery stuck, bogged and exhausted; the pioneers of the 5th and 8th Hussars set to work making the ground firm by means of fascines and round timber, where it was too deep for the guns, and soon made a road passable for carriages, of more than a mile in length.

Works facilitating a flank movement within striking distance of the enemy.—On the 9th July, Colonel Wallis's brigade directed on Branzans, had to execute a march to the flank, rendered very perilous by the approach of the enemy, and over ground intersected with ravines, escarpments and water-courses. The pioneer-sections of the 1st Dragoons and 10th Hussars never left the head of the column, opening trenches and forming roads, when without them, carriages could not have passed.

At Branzans especially, at the foot of a very steep slope, the way

was stopped by the flow of the Igel at this spot 45 feet wide ; in less than *an hour-and-a-half* a bridge formed of trestles in the form of St. Andrew's cross, lashed with rope, and cramped with iron dogs, was thrown across the river and fords found and staked out for the horses. The river was exceedingly deep, and only practicable at one bend where the level altered.

After this affair the pioneers of Col. Wallis's brigade were mentioned in General Orders.

We could multiply these examples cited in large numbers in the work of General Edelsheim ; but as many of these instances present great analogy, we prefer to terminate this historical notice with the reproduction of the conclusion of the report.

"It appears from the examples cited above, and from numerous minor operations executed in camps and bivouac, that the pioneer-sections of cavalry have succeeded in rendering important services in a campaign, where despite the small part taken by the light Cavalry Division, frequent occasions have arisen to shew the grave difficulties which the absence of pioneers would have entailed.

"Of the existence of these wants and their immediate fulfilment, by means of the aid furnished by a section of regimental pioneers sufficiently trained beforehand, one can readily judge by the results relatively easily obtained in this branch by the Austrian cavalry in the year 1866. Extended operations on the flanks and rear of the enemy would show them more strongly.

"It is plain that, had the chances of war permitted us to assume the offensive, these same pioneers would have produced double effect, since the advantages would have remained the same for the Austrian cavalry, and the loss, by the mere fact of the loss of the offensive, would have been much more considerable for the enemy."

II.

ORGANIZATION AND RECRUITING OF CAVALRY PIONEERS.

Thus we have just said the cavalry pioneers in the Austro-Hungarian army have a double duty, on the march or in bivouac : in the first case to render possible, in as short a space of time as possible, the passage of obstacles by the light columns of cavalry.

In the second case to assist in the rapid formation of camps and bivouacs, and thus improve the hygiene of men and horses.

This double mission necessitates there being two classes of pioneers in each cavalry regiment.

1.—The *section* called *The Regimental-Pioneers*, which is always the 4th section of the 6th Squadron.

2.—The *Squadron-Pioneers*, five to each squadron, except the 6th, which has none.

As a general rule, the advance guard is furnished by the Pioneer-section (4th of the 6th squadron), which is obliged to keep the route open as much as possible, and it is the pioneers of each squadron (and a few men detached from the pioneer-section to do duty with the 6th squadron) who perform the small necessary duties at halt and bivouac.

The men of the annual contingent of cavalry who are destined for service as pioneers (whether regimental or squadron) are recruited among the most intelligent of their number, and selected as far as possible from those trades which agree best with their proposed employment.

The squadron-pioneers are distributed among the squadrons so as to complete the regulation effective of five per squadron; their special instruction is (as is that of all the men of the squadron) confided solely to the captains commandant, who make the best use of the means at their disposal in the localities and with the material at their disposal.

The troopers intended for the special section (regimental pioneers) are, on receipt of their orders, posted to their section to complete the regulation effective of 40 men. They are *first* fully trained as horsemen under the captain of the 6th squadron, afterwards they receive their training as pioneers under the lieutenant commanding the Pioneer-section.

Both classes of pioneers must pass the first class in horsemanship before commencing their special training.

It is to be observed that in Austria a trained horseman is made in less than six months, and this is true even for Bohemia and Lower Austria, where the dragoons are recruited from a population not naturally given to horsemanship, as well as for the Hungarians and Poles, the original "Hussars" and Uhlans," who are to the manner born.

Thus with regard to their technical duties, the squadron-pioneers derive their instructions and orders from the captain commanding the squadron, and the regimental-pioneers from the lieutenant commanding their section. But as regards interior economy or regimental exercises these men are under the same regulations as their comrades with the exception of several drudgeries which it is found impossible to make them share, considering the full employment of their time. It seems also quite natural to give them some compensations well earned in dispensing with a certain number of tours of guard, a proportion of parades where their presence is not indispensable, etc., etc., without speaking of some slight advantages in pay equivalent to those of the old French "*Sapeurs*," and which are even better earned by the multiplicity of duties performed by cavalry pioneers.

When it is necessary to club together the squadron-pioneers and the regimental pioneers (special section) for some special end, or for purposes of technical instruction, the Colonel of the regiment issues the necessary orders.

If two regiments work together as a brigade, it falls on the Brigadier-General to decide on the employment of the pioneers in whole or part; the same principle is applied to a division of 4, 6 or 8 regiments where the employment of the 4, 6 or 8 sections is naturally at the disposal of the General of Division.

It is nevertheless recommended that Generals, in making their dispositions, should observe this principle, the neglect of which might at times lead to serious difficulties. "As a rule, group the pioneers of 2, 4, 6 or 8 Regiments, so that the number of the fractions detailed for independent duties at a distance with the advance-guard, and those of the fractions left with each regiment, may be proportioned to the needs and accidents of combat; otherwise, assure the means of immediate destruction of obstacles far to the front, while leaving to the regiment, according to the ground and the probabilities of manœuvring, sufficient means to deal with unexpected contingencies."

III.

INSTRUCTION AND HANDICRAFT OF CAVALRY-PIONEERS.

A.—Squadron Pioneers.—The technical instruction of squadron-pioneers is limited to what is strictly necessary for the internal service of the troops, whether in garrison or in the field.

The practical exercises are so regulated as to teach as well as possible the few simple duties which they should know how to perform, without retarding the cavalry drill in the slightest degree.

These duties are as follows :—

- 1st. Porterage and various labours in quarters and bivouac.
- 2nd. Constructing or repairing open manéges, drill-grounds, &c.
- 3rd. Forming and making up the jumps in manéges, &c.
- 4th. Making, improving, or destroying the minor communications.
- 5th. Repairs in the stables which do not require engineers.

As far as the separation of the regiment into detachments permits the squadron-pioneers are from time to time drilled with the regimental pioneers, but always by order of the Colonel commanding the regiment.

These few details once given, no more need be said on the "Squadron-Pioneers;" only in describing the more important duties of the special Pioneer-Section, it is to be understood that both categories can, according to circumstances, be united to produce more rapidly a given result.

B.—Pioneers of the special Section (4th of the 6th Squadron).—The progress of technical instruction of the Pioneer-Section is based on

the following principles :—The pioneers are taken from men having 12 or 3 years' service, immediately after the arrival of the 12 or 15 recruits annually incorporated in the "1st year class," two or three of the most intelligent are chosen to form as quickly as possible into foremen of shops (*Partie-Führer*), and the others are distributed in the different shops.

These shops are six in number, each one composed of five men; the foremen of shops are equipped with the tools of their trade like their comrades.

The title of foreman of shops is independent of rank, and may or may not be given to a non-commissioned officer. The number of foremen of shops varies from six to ten.

Practice has shewn in the Austrian regiments that at least twelve men may be counted on as fit for the post of foremen of shops; these twelve are the pupils of a class which the lieutenant of the section forms every winter. This class is held, according to the weather, indoors or out; it often happens that the number of pupils far exceeds twelve, owing to the excellent spirit which the men of the section usually shew themselves possessed of.

The first half of the year is devoted to theoretical courses of an elementary nature, while the recruits of the section are passing the riding school; the second half, commencing in March or April, is passed in practical exercises.

Theoretical Course.—During the theoretical course, from October to April, only the pupils of the 2nd and 3rd year classes are exempted from any mounted parades.

Those of the 1st year class go through the riding school, recruits ride, squadron drill, and manœuvres of the regiment.

As far as possible the lieutenant arranges his hours of study (two or three times a week these classes meet), so as to allow the recruits of the 1st year to be present; but they are only obliged to perform the duties of other recruits, and everything is done to aid them in the efforts which they make of their own free will, in the intervals of leisure, to improve their knowledge of their special duties.

In the theoretical course, the lieutenant explains himself or causes the sub-instructor, when qualified, to explain under his direction, the following matters, which form a simple and practical course of geometry.

1st. The point.

To plant a picket at a given point, &c.

2nd. Vertical line.

To plant a rod vertically.

To secure the uprightness of a pole, &c.

3rd. To dress a line in one direction.

To prolong a line, &c.

4th. To trace a straight line on the ground.

5th. To measure and divide a straight line on the ground.

6th. Intersection of two straight lines on the ground.

7th. On Angles.

8th. The right angles.

9th. Superposition of angles.

10th. To trace a perpendicular.

Practical methods.

11th. To trace parallel straight lines.

12th. Levels—Points of equal altitude.

13th. Profiling (principles).

14th. The circle (definitions).

15th. The triangle (observations).

16th. Measurement of angles (observations).

17th. Description of surfaces and volumes. (Detailing to the most intelligent the methods of measuring them).

Practical Exercises.—Before passing to the application in the field of the practical lessons, it is judged necessary to give some slight instruction in the theoretical principles having relation to the work to be performed.

This preliminary teaching which is carried on simultaneously with the elementary scientific instruction (Practical Geometry) of which we have just spoken, commences towards the end of November, that is, in the second month of instruction, so that it may be possible to commence work in the field from March while continuing the theoretic course until July. The section commander repeats the lessons, according to circumstances, ensuring that the first is thoroughly understood and mastered before proceeding to the second.

The programme of practical work taught each year, first *theoretically*, afterwards carried out *in the field*, is as follows:—

1. First principles, use of the tools, etc., felling trees, tying the most common knots, fascine work.

2. Construction of roads and ways. *Their rapid improvement ; their immediate destruction.*

3. Crossing watercourses with cavalry and artillery without using bridges, ramps, fords, crossing over ice, etc. *Hasty demolition of ramps, fords, &c.*

4. Crossing water courses with bridges, roadways, trestle bridges, &c. *Hasty repairs and immediate destruction of bridges.*

5. Railways.—Leading principles of their destruction by the dynamite-cartridge.

6. Various camp duties ; shelter in bivouac, kitchens, latrines, different makeshifts, field filters, reservoirs of water for horses, etc., etc.

7. Hasty Fortification ; pits and cover for skirmishers lying down, rapidly executed shelter for light artillery, various works to strengthen a position, construction of abattis, their removal, &c.

In these seven chapters is taught all that is absolutely necessary for cavalry pioneers. The foremen of shops and most able pupils are, as has been said, instructed in the theory before the others ; their shops are handed over to them in the last weeks of winter, so that they may assist in the instruction of the pioneer recruits in the time that they are able to devote to this duty. In April then, at the latest, work in the field can be commenced, according to a programme which is only a repetition of the seven preceding chapters.

Such is the method which, as we have striven to explain, is employed to render a proportion of troopers in each cavalry regiment fit to render the important services enumerated in the Austrian official document we have quoted ; at the same time they perform all the ordinary duties of cavalry soldiers.

Cadres and effective of the Pioneer Sections.—It has been stated that the 4th Section of the 6th Squadron (called the pioneer section), is always commanded by a lieutenant or sub-lieutenant having the qualifications necessary for the post. This officer takes his orders absolutely, in the administrative point of view and in matters relating to interior economy, from the captain commanding the 6th squadron, and directly from the Colonel of the regiment, as regards matters connected with special employment of the pioneers. This distinction is only rational. It was, however, the principal difficulty to overcome in Austria from 1864 to 1870. Indeed, when the new regulations first came into force, when the utility of these special horsemen in the regiment (now nearly universally acknowledged), was still disputed by those who had not seen their employment in the field, or who had read carelessly the official documents relating to their achievements—the captains commanding the sixth squadrons, as we are informed, sometimes displayed

a fractious contempt for their fourth sections ; hence certain sorry skirmishes which have now almost completely ceased.

The permanent effective of a cavalry pioneer section is 40 men, besides an officer. It is bound to be complete at all times, and is divided internally according to the speciality of the troopers composing it.

30 Cavalry Pioneers	{	10 Troopers, diggers
		10 " pick-men
		5 " axe-men
		5 " hatchet men
		5 " carrying furnished valise

5 Men to hold the horses (recruits or the least intelligent)

3 Corporals

1 Sergeant (Sergeant-instructor of the section)

1 Trumpeter

—
40 Men.

1 Lieutenant, commanding the section.

Equipment and handicraft.—The pioneers have the same uniform, the same arms, and lastly the same horse furniture as their comrades in the regiment.

One tool in addition, its leather case, and two straps to attach it to the cantle of the saddle, form the sole difference in their equipment.

We should add, however, that there is a small difference in exception to this rule in the Uhlan regiments whose troopers are armed with the lance, except 32 men per squadron, who have the Werndl carbine instead. The pioneers in the Uhlan regiments are all armed with the carbine except the men employed to hold the horses, who may have either lance or carbine.

The following table gives the necessary list of the tools, &c., carried by the pioneer sections. There are only, as will be seen, four kinds of tool carried by the troopers and a furnished valise which holds a number of different things.

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The following table gives the necessary list of the tools, &c., carried by the pioneer sections. There are only, as will be seen, four kinds of tool carried by the troopers and a furnished valise which holds a number of different things.

NAME OF TOOL.		Weight. lbs.	NUMBER.			TOTAL	
			In each squad- ron.	In each Reserve Squadron.	In the Pioneer Section.	In each Regi- ment.	In the 41 Regi- ments of Aus- trian Cavalry.
Spade and Case	...	4.96	2	2	10	22	902
Pick-axe "	...	6.28	1	1	5	11	451
Hatchet "	...	3.42	1	1	5	11	451
Axe "	...	6.83	1	1	5	11	451
Furnished Valise	...	5.07	1	1	5	11	451
Total Tools	...		6	6	30	66	706

1st. The pick-axe is of wrought iron, steeled at both points ; it is a solidly made tool and fixed to the handle by two wooden wedges kept in their places by screws.

The handle is 35.4 inches long and 2.4 inches in diameter at the upper part, the weight of the pick-axe and helve together is 5.95 lbs. This pick is in every respect similar to that issued to infantry pioneers.

The case of the pick is of leather doubled and pierced ; it is closed at the parts covering the points of the pick, and is provided with a kind of moveable tongue, which buckles with a strap over the flat part of the iron. A second strap at the neck prevents the pick from coming out of its case; on the case is a loop through which passes the large suspending strap.

In plate 1* (pioneer of dragoons carrying an axe) the mode of carrying is shown sufficiently. Two straps are used—one strap is fixed permanently to the first valise-strap and through it the handle passes ; the other goes round the head, takes a turn round the neck and ascends through the upper keeper of the axe case, and is secured to itself by a buckle, after passing under the centre valise strap.

* Plate omitted.

When work is to be done the trooper only unbuckles and disengages the large strap, he then draws the handle of the axe through the small strap buckled; after first opening the case to allow the head to pass out.

The buckle over the handle remains always buckled to facilitate rapid packing; so that the trooper in case of hurry, merely passes the helve through the loop and buckles the larger strap, then closes the case over the head when mounted.

2nd.—The spade differs slightly from that used by the infantry pioneers.

It consists of an iron blade 10·42 inches wide and 11·21 inches long, the socket of the blade laps over the handle 3·9 inches. This spade is distinguished from the infantry pattern by the flange which replaces the sharp edge on the socket side of the blade; this sharp edge would cut the leather case, and it is also found that the flange assists the soldier in digging by giving a broader surface for the pressure of his feet.

The handle is round and 36·6 inches long; its diameter at the upper end is 1·18 inches. A nail driven through an eyehole in the socket fixes the blade to the handle.

The case for the spade is of two leaves of leather sewn at the sides; the point is fitted with a small iron plate secured to the leather by three rivets. The open side is closed by two tongues, buckles and straps. The spade in its case weighs 4·96 lbs.

3rd.—The large axe, which is of the same pattern as that used by the infantry pioneers, is of wrought iron with a socket back made to act as a mallet. The edge is steeled. The helve, very supple and of oval section, is enlarged close to the socket, the better to resist the shock of the head. Total weight of axe and handle 6·17 lbs.

The mode of packing is shewn on Plate No. 1, in the equipment of a pioneer of Dragoons in field marching order. The small strap is used in the same manner as with the other tools. The large strap, after taking a turn round the neck of the axe, returns under the flap of the case, passing through a keeper, the other end passes through a keeper on the outer face of the case, and both ends are buckled together under the valise strap. Unbuckling and returning the axe, same principles as for pick-axe and spade.

4th.—The hatchet is also of wrought iron steeled at the cutting edge. The back of the socket can be used for a hammer or mallet, and its surface is crossed with 12 grooves to prevent it slipping when used for driving nails. A button-hole cut in the flat part of the blade is useful for extracting nails. The handle is of oak and octagonal in section; it is strengthened at the socket of the blade by an increase in thickness. The hatchet with its handle weighs 2·95 lbs.

The case of the hatchet is of the same form as that of the axe. The hatchet in its case weighs 3·42 lbs.

The small strap is attached as with the other tools; the large strap passes through keepers on either side of the case and is buckled under the centre valise strap to the cantle. The hatchet is attached and detached as with the preceding tools, but more care is required in buckling it on when mounting and starting rapidly, as the handle will not counterbalance the blade, and if simply passed through the small strap the tool will at the trot fall out of the loop and be lost.

5th.—The *furnished valise* is of calf skin, like the infantry havresacks, with the hair outwards, and lined with canvas.

It is carried by a belt suspended from the left shoulder. The valise is closed by three leather covered buttons by which the flap is secured.

The valise is a quadrangular prism 13·4 inches long, 1·38 inches deep; the cover is 6·3 inches wide.

An empty valise weighs 1·54 lbs. The cavalry furnished valise contains five kinds of things, viz:—

1 Pair of Pincers.

1 File.

1 Jointed Saw.

1 Hammer (claw).

Pack thread and Nails, viz.	{	50 Nails, 1·11 inch.
		25 " 1·78 "
		1 Spike, 3·53 inches.
		1 " 4·41 "

The pincers of wrought iron are steeled at both cutting edges.

The file is steeled along its whole length.

The jointed saw is composed of 25 pieces cut into teeth and acting on 24 others, the whole kept together by numerous rivets; at the two ends of the saw is a piece finished by a ring, through which is passed a wooden handle when the saw is used. When the saw is packed in the valise, it is rolled up and occupies very little room.*

IV.

METHODS OF CARRYING OUT THE PRINCIPAL WORKS EXECUTED IN THE FIELD BY THE CAVALRY PIONEERS.

After reviewing the history, organization, method of instruction

* It has been proposed to add a joiner's chisel, 11 inches long, handle included.

and equipment of the Austro-Hungarian Cavalry pioneers, a word must be said on the processes employed in carrying out the various field works executed. These works, of different importance and nature may be divided into three main heads.

1. *Earthworks.*
2. *Forming bridges.*
3. *Rapid destruction of railroads.*

We shall examine them successively, dwelling on the details of the third head, which appears to enter more specially into the duties of cavalry advanced guards.

1. *Earthworks*—The work required from cavalry pioneers must be very simple, and capable of being easily and rapidly executed; the most interesting works are :—

The hasty formation of a road for cavalry and light artillery, the formation of practicable routes across fields, woods, marshes, &c., the construction of ramps for artillery, in bivouac or on the field of battle.

The construction of shelter trenches for skirmishers lying down, and of epaulments (gun-pits) for light artillery ;

• Lastly, the different works required in camp.

To examine in detail the method of executing these different works would exceed the limits of this essay, and would seem to give it a technical character, contrary to the spirit of the creator of Cavalry pioneers, as we understand it ; besides there is great similarity in the execution of all kinds of hasty earthworks, and their very rapidity, while requiring *more order and method* in execution, seems incompatible with the regularity of the processes employed by the engineers in the execution of the more durable and important works of temporary fortification.

In principle, the conception of the work and the carrying it out by the pioneers should be nearly simultaneous ; a few directions rapidly given to the foremen of shops as to the part to be taken by each, constitutes all the preliminary arrangement, and is immediately followed by the pioneers setting to work at their different trades. The most interesting study then is to see how the preparatory dispositions are made, and how the officers succeed in utilising to the best purpose, the different classes of workmen which a pioneer section contain.

Let us suppose the advanced guard of a strong column of cavalry to contain several sections of pioneers ; it is the rule, when two or more sections are massed, that the command rest with the senior lieutenant of pioneers present, who is alone responsible for the direction and execution of the work to be done. The duties of this officer require him to reconnoitre the ground so as to be able to make his dispositions in

advance. He therefore precedes his men as far as is possible so that no time may be lost in setting to work immediately on their arrival at the scene of their labours.

To commence work at the word "*Halt dismount,*" the men told off as horse-keepers (1 to 6 or 8 pioneers) spring smartly to the ground and raise their right arms in the air, grasp of the hand closed ; the other troopers immediately throw their reins over the forearms of the horse-keepers, and at once proceed to put the hobbels on to the horses. Each pioneer has on coming on the ground already loosened the large supporting strap of his tool, and opened the case, so that on the word of command from the senior lieutenant "*Fall in for work,*" the pioneers at once fall in on their markers 15 paces in front of the horses, this occupies two or three minutes at most. During this time the officers have received their instructions from the senior in command, and, in front of their respective sections, proceed at once to explain to the foremen of shops the work that has to be carried out.

These preliminaries terminated, each section of pioneers proceeds under the direction of its immediate chief to the ground marked out for it. Deducting 5 horsekeepers, there will remain 35 workmen per section.

A pioneer section is grouped for earth works into squads of 3, 2 shovellers and 1 pickman per squad, placed four feet from each other, the pickman in the centre

The workmen having been dressed in line according to the form of the work to be thrown up, the lieutenant of the section gives the word "*Steady.*" The shovellers remain at attention, the pickmen trace with the point of the pickaxe a line passing by the toes of the shovellers on the flank of them. At the word "*Commence work*" each one begins his task.

It is plain that no absolute rule can be given, the methods varying with the work to be done ; in the case, for instance, of a damaged road to be repaired, the pioneers armed with axes and hatchets may be sent to obtain faggots of wood, which they bring to the squads to which they belong, and then all participate in the common labour, using all the means at their disposal.

II. *Bridging*—The construction of flying bridges practicable for artillery, and formed by cavalry pioneers, is undoubtedly one of the most remarkable results obtained in late years by the Austrian cavalry.

One should not however exaggerate the importance of these works which have come within the general scope of the cavalry pioneers, these latter are before everything, as we cannot too often repeat, horsemen and effective soldiers of the advanced guard ; these constructions are not and should not be more than more or less incomplete erections, such as

putting together the materials found on the spot, and sufficiently strong to supply the wants of the moment.

A few baulks or trunks of felled trees of large section, a few spars lashed with rope or fixed with dogs, such materials as can almost always be found and conveyed to the spot, are sufficient to establish communication over water courses not exceeding 20 yards in width, and sufficiently strong to allow, at least for the time, the passage of cavalry and even light artillery.

The experience of the campaign of 1866, and the results obtained daily by the pioneer sections of the Austro-Hungarian cavalry, does not leave the possibility of a doubt that these constructions can be easily made,⁶ and that by men of whom the oldest soldiers do not count more than three years' service.

If one supposes a corps of cavalry, for instance a division, working in front of the army or on one of its flanks, fractions, more or less considerable, of this force will have to follow certain roads very little used, upon which they will suddenly encounter a deep water course 15 or 20 yards wide with steep banks, the nearest bridge is several leagues distant, perhaps occupied by the enemy, the necessity is urgent, the pontoon train and troops of engineers distant. Under these conditions, the Austrian cavalry can face the difficulty with its own resources, the kind of bridge generally used is called "*The St. Andrew's Cross*," from the form given to the trestles formed of spars lashed together, and the formation of this bridge never occupies more than an hour and a half or two hours.

The sections having arrived before the water course to be bridged, the first dispositions as to dismounting, alignment in front of the horses &c., are made as in the preceding example ; during this time reconnoissances are made up and down stream in search of a ford, *which is always employed in preference.*

The report of the reconnoitring parties having demonstrated the necessity of forming a bridge, the lieutenant in command assembles the section leaders and apportions them their work ; he fixes the number and positions of the bridges to be constructed, and distributes the sections among them, (35 workmen per section).

The first question is how to find wood ; dressed wood, palisades, wood in the round, &c., ; this has occupied the commander's mind as soon as the necessity for forming a bridge became probable. One third at the least, of the men of each section are despatched to collect materials while the others prepare the work, and are distributed in the following manner :—

- 20 Men. $\left\{ \begin{array}{l} 1^{\circ} \text{ Squad of 5 men for the shore bay.} \\ 2^{\circ} \text{ Two squads of 5 men to prepare trestles.} \\ 3^{\circ} \text{ Squads of 5 men to receive and prepare materials.} \end{array} \right.$

On the average when the materials are on the spot, 1½ hours are sufficient for a section of one regiment of Austro-Hungarian cavalry to throw a bridge supported by three trestles, and 50 feet in length; à fortiori the same work would be done in the time if as we have supposed 2, 3, or 4 sections of pioneers were massed at one point.

1° *Shore Bay*.—The party charged with this work prepares it with the greatest care, dresses the ground, trims the road bearers, places them and secures them with large stakes.

2° *Trestles*.—As many squads as there are trestles. The squads put together the spars and lash them firmly where they cross, the materials being supplied by the 3rd squad.

Two joists or spars of round wood of sufficient scantling serve for the legs of the trestles; these two legs are joined by transoms laid over them so as to form a rectangle.

This frame is kept in shape by two diagonals of less strength, which give the name to the trestle. The lashings are strongly bound at the angles and centre with rope, of which the pioneers carry sufficient. Two long poles are attached to the diagonals in prolongation of them to serve to direct the trestle when it is being placed. The length of the legs is fixed by the depth of the stream to be crossed; their width apart is at least 10 feet.

3° *Collection and distribution of materials*.—The fourth squad for each bridge is charged with receiving, examining, and distributing materials. It takes the men who return from the search for materials and employs them when they have performed that duty, as carriers of baulks, hurdles, road bearers, &c.

The materials having been collected, and the preparatory labours executed by these four squads, the bridge is formed by seven successive stages.

- 1° Launch the 1st trestle.
- 2° Dress the bridge in the alignment.
- 3° Form the roadway of the 1st bay.
- 4° Form the 2nd bay, &c.
- 5° Form the 2nd shore bay.
- 6° Intermediate supports if necessary.
- 7° Handline (of rope).

1° *Launch the First Trestle*.—To launch the trestle, the troopers form an inclined plane by aid of two spars a little less than 10 feet apart, and inclining from the shore bay into the river; two men hold on to each spar to keep it in position despite the force of the current. Five men now bring up the trestle; these men are placed one at each directing pole, and two at a centre directing pole fixed to the centre

of the cross, provisionally, as are the other two to the diagonals; the fifth man is ready to assist where he is wanted. At the word "*Attention*" every one in his place.

At the word "*Launch*" all act together to make the trestle descend to its proper place.

2° Dressing the Bridge.—The difficult moment is when the trestle touches the bottom, it must then be dressed vertically, and exactly in the line of the bridge. The flow of the water below, and the weight of the part not submerged must be considered.

The trestle is first provided, if necessary, with flat stones lashed to the lower transom; with a little practice the eight men charged with the launching effect it easily, and retain the trestle in position, with a slight inclination towards the bank commenced from, to insure the eventual uprightness of the legs.

This done, two foremen of shops get astride upon the trestle, and drive the spikes, which prevent the chance of the upper transom slipping under the weight of the roadway. Another man then places himself astride of the transom. The road bearers, proportioned in number to the breadth of the bridge, are then fixed, and the temporary spars used for getting the trestles into position are removed.

If artillery is to use the bridge the number of road bearers must be increased, and the distance between the trestles must be reduced.

Also, if, in default of planks, fascines have to be used for the roadway, its greater weight will necessitate more road bearers.

3° The Roadway.—If chance places planks, sufficiently long and thick for the roadway, within the reach of the pioneers, they have only to be sawn and laid on the bearers, with ribands of wood fixed over them at their ends.

If, as is more commonly the case, these materials are wanting, the road bearers are multiplied, and the trestles doubled and placed close together in couples, so as better to resist the strain caused by the heavier fascine roadway, which must then be employed. The roadway is then laid, and completed by laying fascines lengthways at the edges.

4° Second bay.—The second bay is made in the same way as the first, and so on to the 2nd shore bay.

5° Second shore bay.—This is made in the same way as the first shore bay. It is finished up by a baulk sunk in the ground, and fixed by pickets at either end, into which spikes are driven to secure the road bearers to it.

6° Intermediate supports.—If in spite of all the precautions taken in constructing the bridge, a good choice of scantlings, a well calculated length of bay, &c., it is thought that the bridge is still weak, intermediate supports are added, arranged as follows :—

Two spars of sufficient strength are placed in the form of the letter A, reaching from the bottom of the river to some height above the roadway and touching it; another pair is placed on the other side; a baulk passing under the centre of the bay which threatens to give, is suspended by its ends to the summits of the two A's by cordages. Pickets are placed between the strands of these cordages, and the suspending cords are twisted up until the roadway is raised and strengthened; the pioneers are accustomed to practise this operation, and when time and materials are available, it is always desirable to place as many of these supports as possible.

7° *Hand-line, Road to the bridge.*—The last operation is to stretch a cord from bank to bank, on each side of the bridge at the height of the breast. This hand line starts from the pickets placed at the two ends of the sunken shore transom, and is attached to all the pieces of wood which project above the roadway to a sufficient height. It is a precaution which should always be taken, and a faggot should always be put in front of the shore transom with a little ramp of earth to smooth the way on the bridge.*

In conclusion, while considering the construction of a bridge 50 or 60 feet in length as altogether exceptional, it must be acknowledged that the possibility of their construction is very valuable to large bodies of cavalry, and through them to the army at large; it is at least incontestably useful to apply these principles to crossing small [water-courses of 20 or 30 feet in width, canals, &c. Cases for the employment of such small bridges frequently occur, and very often *points of cavalry have been frustrated by natural obstacles, in themselves contemptible, but which are far from any possible assistance of the special corps.*—*The Royal Engineer Journal.*

* *Observation on Spikes.*—A bridge of this description requires at least four spikes per bay. As there are only five spikes in the five furnished valises, a section must, if it has to perform this work alone, provide itself with others.

NOTICE.

MEMBERS of the Institution who have not already done so, are earnestly requested to pay their arrears of donation and subscription, either to the Corresponding Members at their stations, or direct to the Secretary at Simla.

Some members still owe their donation and three years' subscription.

Officers, who may wish to become members, are requested to be kind enough to forward their donations and subscriptions at the same time as they express a wish to join the Institution, and also to inform the Secretary whether their subscription is intended to be for the current year which ends on the 31st May 1876.

Members can pay their subscription to the Alliance Bank, Simla, if more convenient, and the Bank will grant receipts for any money sent.

The entrance fee is 5 rupees and the annual subscription 5 rupees.

Members on changing their addresses are particularly requested to notify the change to the Secretary, in order that delay in forwarding the Journals may be avoided as much as possible.

The address book is corrected up to date from the Army Lists, but mistakes are occasionally unavoidable unless members themselves promptly notify their change of residence.

Members proceeding to England on leave, who wish the Journal to be forwarded to them while absent from India should inform the Secretary, and send stamps for the overland postage by Brindisi or Southampton as they desire.

When a member appears in orders for leave to England, his Journal is not despatched unless he asks for it, and while absent from India his subscription is not payable unless the Journal is supplied.

Members on return from furlough can obtain the numbers of the Journal that have been published during their absence, by paying the subscription for that period, and all members on returning to India should inform the Secretary of the fact at once.

The Secretary will be happy to send an Index to volumes I, II, III to any member wishing for the same.

H. H. STANSFELD, LIEUT.-COLONEL,
Secretary.

ORIGINAL PAPERS.

I.

ON THE BEST MODE OF PROVIDING RECRUITS AND FORMING RESERVES FOR THE BRITISH ARMY,

BY
CAPTAIN J. C. FIFE,
65th Regiment.

PREFACE.

THIS Essay was written for the prize medal of the United Service Institution, for 1874. I have slightly altered and added to it in parts, to make my meaning more clear, or with reference to recent occurrences.

It embodies a plan of recruiting and forming reserves, first advocated by me in a pamphlet at the end of 1870, which may be summarised as follows:—

1. Voluntary enlistment for the various forces, encouraged by every judicious means.
2. The Militia ballot to be enforced, effective Volunteers being exempt; also those electing to pay for this privilege (*vide* No. 4).
3. The Militia to be ballotted to supply the regular Army for *war service only, voluntary enlistment failing*.
4. Substitutes not permitted for those drawn by either ballot, but persons *on payment according to their income, exempted from the ballot for the Militia*.

The latter is the special feature of the entire scheme.

It is encouraging to me to observe the gradual tendency of public opinion to acknowledge the justice and value of this principle of payment for exemption, in proportion to income. Thus, on the 4th March and 20th May, 1871, speaking of the pamphlet in which I first proposed it, the *Broad Arrow* stated that, "the scheme would give advantages to men with money," and that "it would be a sliding scale poll tax, with no possible machinery for adjusting the slider."

It can be imagined therefore, with what pleasure I observed on taking up the *Broad Arrow* of October the 3rd, 1874, that the full weight of that valuable paper was given in a leading article, to this chief feature of my plan, which was now considered most desirable to be adopted, in combination with the Militia ballot.

I may remark that difficulties of detail would probably prevent the classes of incomes paying an equal amount for exemption from being small, and thus as an extreme case, we might even find men with £100 a year paying as much as those with £1,000 a year, or those with incomes just exceeding £50 a year, paying as much as those having nearly £500 a year.

But any classification for payment in proportion to income, is fairer than none at all, for in the latter case the price of a substitute or of exemption is alike for poor and rich.

If the principle is admitted in the first instance, perfection of detail will be approached after trial and experience.

The expenses of a great organization are provided for by the payments.

Substitutes, the disadvantages of whom are treated of in the body of the essay, are rendered unnecessary.

A choice of methods of obtaining exemption is given, which would make the scheme as nearly a purely voluntary one as possible, and cause it to be regarded as one of "persuasion to serve," rather than of "compulsory service."

Any system of ballot, &c., appears to us almost too complicated for trial, but if we consider those of the other great powers the difficulties diminish by comparison.

Similarly the slight restraints and personal inconveniences which such a scheme as the above would cause, sink into insignificance when compared with the rigorous systems of Prussia, Russia, &c., where all are liable to service in the Regular Army during peace or war, and substitutes, or other equivalent modifying arrangements, are not permitted.

Mr. Hardy has said, when speaking officially, of the Army:—"If we were involved in a war in which it became necessary to send our Army abroad, it must then be regarded as the nucleus of the Army which it would be necessary to raise, if it had to compete with those of the Continent."

But the decisive periods of wars now often number only weeks instead of months or years, as formerly, owing to the perfection of organisation of one of the belligerents and to good communications; and we have the example of the huge French levies of 1870, to show the very small value of extemporised troops.

Let us then make preparations for the hour of trial, now that we have leisure to do so effectively. If it is long deferred, so much the better; perhaps its being so may be due to our preparations, and in any case we are certain to gain in the dignity of our natural position, if not in solid advantage indirectly due to our increased strength. When it does come it will be found that we have set our house in order.

Ce n'est que le premier pas qui coute.

J. C. FIFE, CAPTAIN,
65th Regiment.

SANDHURST,
15th March 1875.

ON THE BEST MODE OF PROVIDING RECRUITS AND FORMING RESERVES FOR THE BRITISH ARMY, &c., &c.

To consider whether the country is yet ready for a scheme of service more or less compulsory appears to me to be beyond the scope of this essay ; but not so, to assume it as a possible condition of the question, and to point out the advantages which would follow its adoption.

I will, therefore, suppose that on account of:—

The failure, after fair trial, of all means short of compulsory service, to furnish adequate forces for war service, and the certainty that the evil is increasing with the price of labour.

The undoubted necessity of large bounties during war under a purely voluntary system.

The Military taste of the country having been increased by the reaction upon it of its own result, the Volunteer movement ; and by watching with pride and interest the progress of our troops in two small but successful wars, unattended by the sobering spectacle of the great sufferings and hardships inseparable from a conflict between two great nations.

The changes that steam has wrought in the sea transport of troops, doing much to bridge the waters which have hitherto so often saved us from invasion.

The huge military systems of all the other great powers of Europe.

The chance of war being less if it is seen that we are well prepared, especially as our well-known defensive policy would prevent our strength from appearing a menace to other powers.

Our proud position as the protector of vast colonies and dependencies ; our interested one as the possessors of an enormous commerce.

The possibility of a combination of hostile powers, or the chapter of accidents, depriving us for a time even of the command of the sea.

The necessity of forming strong reserve forces, so as to free great portions of the fleet and the army from direct home defence, thus enabling them to strike at the commerce or the territory of the enemy, making him repent having forced us to take up arms, and causing him to wish for peace ; also, by an offensive movement, giving indirect defence to our own shores.

Being advised by the lessons of the War of 1870, when the huge masses of French—hastily raised, badly armed and fed, and without discipline, which is the result of habit alone ; commanded by d'Aurelles de Paladines, Trochu, Faidherbe and Bourbaki—were defeated by German armies far inferior in numbers, showing that the measures which gave the men came too late.

We will then assume that, influenced by these facts, to secure the advantages and avoid the evils indicated, the country determines to adopt a form of service more or less compulsory, one which, though thoroughly effective, must be as little irksome as possible to all classes of society. Moreover, it does not await the hour of disaster and confusion but averts the former by providing against the latter, when there is the leisure to do so effectually.

If we consider to what extent it would be necessary to make service compulsory, we are led to enquire into the merits and capabilities of voluntary enlistment.

It is most in accordance with the principle of personal liberty.

A force thus maintained will be morally superior to one recruited from the same material by ballot (and it is scarcely possible to over-rate the importance of the moral element), as it will contain a larger number of men who are soldiers not only by profession but by instinct.

Also the fact that it has undertaken to serve of its own free will, increases its fighting inclination, and is even calculated to be not without its effect on the mind of an adversary.

If the hardships of war are forced on a people by a rigorous system of compulsory service in the Regular Army as on the Continent, the desire of many men to avoid them becomes much increased, and in time the character of a nation may even be affected by it; whereas to undergo dangers and hardships, which are in accordance with the tastes of the individual, is looked upon as a not unpleasant duty or even as a pleasure. We may mention by way of example, the volunteering of officers whenever there is a war, however small.

Public and private business are best suited by voluntary service, as only the unemployed or badly paid enlist.

As far as voluntary enlistment will supply us, it should be made to do so, and it should be encouraged by every available means. Compulsory service should supplement it, and where the former fails the latter must take its place. Again the principle, according to which the "compulsory" portion of a scheme is framed, should be made to approach as nearly as is consistent with efficiency to that of voluntary service; and the more nearly this can be done, the better inclined the country will be to adopt it.

To be efficient, the scheme should provide with certainty and economy, for the large and rapid augmentation of the Regular Army, by drafts of at least partially trained men.

It must provide very large and fairly-trained home defence forces, at a comparatively small cost, which should have, say, the discipline of the Militia, with the small cost of the Volunteers.

If, in addition to this, we could by some means remove all limit to the numbers available for this service, and at the same time provide to some extent for expenses, we should have such reserve forces, that the chance of invasion, which those competent to judge state to be at present by no means a wild notion, would become a thing of the past.

I will now state my plan :

(a.) Voluntary enlistment for the Army, Militia, and Volunteer service, encouraged by every available and judicious means, and supplemented by :

(b.) Ballot for the Militia, efficient Volunteers entitled to exemption, which would be also granted on payment of a sum in proportion to the income of the purchaser.

(c.) Ballot of the Militia to augment and supply the Regular Army for war service only. Voluntary enlistment failing to do so adequately. No exemptions from this ballot.

(d.) Substitutes not permitted for those drawn by either ballot.

Clause (a) we may be considered to have already discussed.

Clauses (b) and (c) together provide reserves for the supply of the Regular Army, and (b) alone that the strength of the Militia can be made sufficient for the discharge of all its duties.

As regards the Army and Militia, the plan depends on two conditions for success. First, that sufficient men should choose the alternative of the Militia ballot, in preference to Volunteer service or purchase of exemption. Second, that to escape draft by ballot from the Militia into the Regular Army, may be brought as far as possible, if not absolutely within the reach of all, *i. e.*, that service in the Militia which entails the liability to this ballot, or in fact the ballot for the Militia itself, may be easily avoided by those wishing to do so.

Evidently the more this becomes the case, the less compulsory the war service in the Regular Army will be. For if a man who can easily avoid the Militia ballot, should not do so, he voluntarily accepts his liability if drawn, to the subsequent ballot for the Regular Army if required. In fact his fate is in his own hands. Could he desire more under any system of service ?

I will now endeavour to show that these two necessary conditions of success will duly result from my plan : and first that sufficient men would prefer to submit themselves to the Militia ballot.

Let us glance at the proposed relative position of the Militia and Volunteers. During peace each would have about the same amount of training, but the Militia would be a paid force, which the Volunteers

would not be. The latter would also, when on duty, be under a modified form of martial law ; on the other hand, the Militia would be liable to be ballotted to supply the Regular Army for war service.

To proceed : we may consider the Militia recruits to be of four classes.

First.—Those who would join voluntarily.

Second.—Those who would choose the chance of the Militia, because it is a paid force.

Third.—Those who wishing to avoid all military service without purchasing exemption from the Militia ballot, would run the chance of the latter.

Fourth.—A very large class who are almost or wholly indifferent as to whether they serve or not, but who do not enlist in the Militia at present, because they have not sufficient energy, or their attention is not turned to it, and no pressure is put upon them.

Should too many enter the Volunteers to avoid the Militia ballot, the former service can be made relatively less advantageous, by increasing its work, thus at the same time giving it greater efficiency ; should too many purchase exemption from the Militia ballot, the rate of payment must be increased.

Thus it appears that in any case, sufficient men could be caused to submit to the Militia ballot.

Next, avoidance of compulsory war service in the Regular Army is brought within the reach of all. As we said before, this is a question as to the facility with which the Militia ballot can be avoided.

Now the very poor man who may not be able to afford the small sum necessary to purchase exemption from the Militia ballot, can obtain this exemption by entering the Volunteer force.

While the rich man whose time is money, and to whom absence on duty in the Volunteers might mean heavy loss, will probably purchase his exemption. Of course, if he did not like to pay the sum required, he could gain his object by serving in the Volunteers.

Thus all service in the Regular Army could be avoided by any person, if he so desired, whatever his circumstances.

I submit that I have shown that the two conditions on which the success of the plan with regard to the Army and Militia depends, would result from it.

And now to consider its effect on the Volunteer force :—

The desire to avoid the ballot for the Militia, and that of the Militia for war service in the Regular Army, would be the great moral lever by which the discipline and military tone of the Volunteer force could be raised. For a Volunteer would no longer feel that he might quit his service at the caprice of a moment, but that to do so would be inexpedient ; how this would strengthen the hands of those seeking to instil discipline into the force, only those who have served can know.

In addition to the moral improvement, the access of material or physical force would be immense. Enrolment in the Volunteers as an easy mode of avoiding the Militia ballot, and the perspective chance of draft into the Regular Army for war service, would assume such huge proportions that the difficulty would be to organise the forces thus given, yet, owing to there being leisure for the purpose, this would at last be successfully accomplished, while the expenses would be to a great extent defrayed by the money paid by purchasers of exemption from the Militia ballot.

I submit that the success of the plan with regard to the Volunteer force, would not be inferior to that of its results on the Army and Militia.

By clause (D) substitutes are not permitted, though they are the usual means employed to render less stringent the necessity of personal service. Some other plan is therefore necessary to replace it, for, if to serve in the Volunteers were the only alternative from the Militia ballot, the system would act very severely on those whose time is occupied by important business, &c., and especially so during war, when the Volunteers would undergo much training.

As we have seen, the plan I have adopted for this purpose is that of payments for exemption from the Militia ballot, in proportion to the income of the purchaser.

Either this one or that of substitutes, would render the scheme bearable to the commercial and the moneyed classes of the country, who would otherwise be certain to oppose its introduction.

My reasons for choosing the plan of money payments are as follows :—

By the sliding scale of payments for exemption from the Militia ballot according to the income of the purchasers, this exemption would be made as far as possible obtainable with equal facility by both poor and rich, whereas the price of a substitute being the same to all, would be paid with difficulty by the poor, especially during war, or even be quite beyond their reach, while remaining a mere trifle to a rich man.

I therefore claim that my plan of sliding scale payments is more just than that of substitutes, and, while by it the interests of the wealthy

are considered, this is by no means done at the expense of their poorer brethren, who can purchase exemption for a small sum, while the rich man pays more in proportion to the value of his interests, which the proposed organization would protect.

Again, in this way, large sums being accumulated, they would be available to meet the expenses of organising the vast reserve forces which we have seen that the plan would give : the supply of arms and stores, and arrangements for transport.

If substitutes after the Militia ballot were permitted instead of money payments before it, the ranks of the Volunteers would not be filled as in my plan, by men who know that if drawn for the Militia there will be no escape either from service in it, or from the subsequent ballot for the Regular Army, should it become necessary. They would, on the contrary, submit to the Militia ballot, and, in the remote contingency of being drawn, would, by providing a substitute, entirely escape military service.

For precisely the same reason, the before-mentioned moral effect of the ballot on the Volunteer force would be far less powerful.

Again the substitutes *paid to enter the Militia*, would, if left to themselves, have perhaps voluntarily enlisted into the Army ; thus the latter service is made to compete for recruits on unequal terms with the former.

Last, but by no means least, the plan of substitutes makes no provision for expenses.

I have known the objection made to my plan, that though the country has a right to every man's service if required for its defence, that it would be undignified to accept a money payment in lieu.

The objection appears to be merely a sentimental one, if it exists at all. Does not the country accept the taxes, and what would this be but a tax where one man gives his service, and another the money to make that service available ?

Fines or damages for instance are found to be good preventives for offences against the laws, and though they might be easily objected to from a sentimental point of view, no one wishes to recommend the discontinuance of the system.

This is a practical age, and if it is found that such arrangements answers their purpose better than any other, or are in fact the only ones that will answer, it is hard to conceive why we should hesitate to adopt them if they are neither unjust nor immoral.

It has also been said that much difficulty would be experienced in adjusting and working the sliding scale system of payments. I readily admit the fact. Objections can be raised to any system which can be

proposed, and if our object was to adopt one which whether fulfilling its object or utterly failing to do so, was not to give us much trouble, I would consider this a serious drawback. But I am sure that I am right in assuming that as long as the great object in view is completely gained, to do which it has been supposed that the country has sacrificed personal convenience so far as to adopt a form of service more or less compulsory, that it would expect, even at the cost of extra labour, to be put in possession of a really efficient system ; and I submit that the advantage already mentioned of the sliding scale payments would repay the trouble of working them.

The Income Tax being possible, leads me to believe that this plan is so, and whereas a man must pay his Income Tax whether he like it or not, he has here the option of serving in the Volunteers if he prefer it.

It has been recently under consideration to do away with the Income Tax, but instead of doing so absolutely, could it not be replaced by the tax for defensive purposes here proposed, where the vexatious character of the first-mentioned impost, which forms one of its chief drawbacks, would be to a great extent removed by the option of personal service in the reserve forces being given ; while, by regulating the rate of the sliding scale payments, age of liability to service, and duration of such service, the severity of the tax could be completely controlled.

We have seen the advantages which the scheme would secure.

Of those plans which have been proposed to meet the wants of the Army and Reserves of which we are now treating, I will allude to two only : to the first, because it is most generally known, and to the other, because I consider it the best I have heard, of course with the exception of the one proposed in these pages.

The first is :—Ballot for the Militia exempting only efficient Volunteers. Now it is evident that by this plan no direct or certain provision is made for the supply of men to the Regular Army, nor for the expenses of the Reserves ; and as no alternative to service in the latter is given, the plan could not but prove irksome to the country, and its introduction would be resolutely opposed, especially by the more influential classes.

The next is as follows : Ballot for the Militia, if necessary, great facilities for substitutes being given ; also to supply the Army by drafts from the Militia for War Service. This plan has the advantage of providing for the Army ; on the other hand, it has all the disadvantages enumerated in the comparison of the plan of substitutes with that of sliding scale payments, viz. :—

Unequal pressure on poor and rich, owing to the price of a substitute being the same to all.

No provision for expenses possible.

The effect on the moral and physical strength of the Volunteer force inconsiderable.

Substitutes paid to enter the Militia, who might otherwise voluntarily enlist in the Army.

A word regarding the system of substitutes in France, previous to 1870. Men drawn by the ballots for the Army, and who wished substitutes provided in their places, paid the Government a certain sum of money (the same for poor or rich), but the Government failed to find the substitutes in all cases ; hence an undue numerical weakness in the forces resulted. Nor did it furnish accounts of the money thus paid for exemption. The elements of failure in such a system are sufficiently obvious without comment.

Let us now proceed to consider how voluntarily enlistment can be best encouraged, whether supplemented by compulsory service or alone ; and to examine the various expedients which have been suggested for the purpose.

The rapid and successful formation of a Reserve Force of retired men, without diminishing the strength of the Army, depends upon service in the latter being not only short but compulsory *in times of peace as well as of war.*

This in our case would imply the banishment from their homes of many of those drawn to garrison our possessions across the seas, and unless a local Army for India, a plan which has already failed, was again adopted, it would not be possible, nor does it appear to be at all necessary.

To provide for Colonial defence, as well as the greater excellence of long-service troops, tends to make long engagements desirable ; on the other hand, the great value of trained men in the Reserves is a strong argument in favour of short service, and now that we have the latter we should give it a good trial and every chance of success.

The following expedients would greatly assist in the encouragement of voluntary enlistment, and to make the most of the available supply of recruits.

To re-introduce the system of pensions.

Reserved pay to be accumulated and handed over to a man after the completion of his last period of Army or Reserve service.

The first term of six years' service to be a probationary one, and by increasing the pensions and reserved pay of those who re-engage, to retain most of the good men in the Regular Army for a further period of service.

Bad characters to be weeded out at the end of their first period, receiving no reserved pay.

Any man suspected of having re-engaged in another regiment, after discharge as an objectionable character, to be handed over to the civil power for trial, and if convicted, to be marked and receive additional heavy punishment.

Marking, in cases of ignominy and desertion, to be re-introduced. This is merely a measure of self-protection on the part of the taxpayer.

The advantages of Non-Commissioned Officers to be increased while serving, and especially on retirement by pensions and reserved pay.

The men to be instructed in a trade while serving.

Employment to be, as far as possible, provided for reserve men and retired soldiers of good conduct generally.

Localisation and an intimate connection between the various forces of a district to be promoted.

Men to be permitted to enlist for particular regiments as formerly and not to be obliged to do so as now for a brigade.

Military tuition to be given at Government and public schools.

Let us briefly consider these plans.

No doubt pensions, small as they were, did much to encourage enlistment. They should be re-introduced, made larger, and be in proportion to rank, length of service, and good conduct. An increase to pensions will produce a better effect than an equal increase to pay, and at the same time be more economical, for most soldiers, feeling their inability to save money from their pay, prefer it in the form of pension. It is evident too, that it is less costly to pay after the lapse of some years, than at once, for the discount is saved. Casualties would also lessen very considerably the claims to pension before they became due.

A pension should be given to all men whose conduct is such that they are permitted to re-engage, or to serve in the reserve forces, after their first or probationary term of six years in the Army.

Reserved pay appears likely to prove a good idea. The sum accumulated should not be given to a man before, but after his service in the reserve forces, he would therefore not be assisted by it to emigrate too soon, and we would be able to find him when required, for he would not run the chance of losing the money by being out of the way.

The opportunity to introduce the plan of reserved pay, is evidently when it is next intended to give an increase of money advantages to the soldiers, which should certainly take this form or that of pension, as he seldom avails himself of the savings' bank to make provision for the future.

As there would be no compulsory service in the Regular Army in the time of peace, we could not then reckon with certainty on possessing a larger supply of recruits than at present, though the wide extension of reserve force service and the ballots, would probably turn men's thoughts more towards the Army, and thus might be productive of good. At any rate, it may be assumed that we would have to economise our supply.

We should therefore make it worth while to those who at the expiration of their first six years, are found to be good soldiers, to re-engage for a further term of six, or even to complete twenty-one years, if they preferred to do so. We would thus attract the professional soldier into the ranks.

A bad character should be got rid of at the end of his first period and not even be permitted to enter the reserves.

This should be one of the advantages of a short term of service, viz. : that it can be made a probationary one, and the bad characters got rid of at its expiration, thus improving the tone of the barrack-room, and preparing it for recruits from a higher social class.

Should a man not be permitted to retire to the Militia, or re-engage in the Regular Army, he would get no reserved pay for the time he had served.

We cannot have too many long-service men in the ranks, if they are of good conduct and physically fit, and they are especially necessary to furnish non-commissioned officers.

To prevent the retired soldier in the reserve, or the discharged bad character from re-enlisting, and to stop desertion with the object of enlistment into another corps, it was suggested that every man on entering the service should be marked with the crown or broad arrow, this plan was followed in the Roman Army, but marking or branding from its long application to cases of ignominy and desertion, has naturally come to be looked upon as a disgrace, and whatever pains might be taken to prevent it, false impressions would get abroad regarding it.

The classes from which our recruits are principally drawn, are quick to conceive a prejudice, and to act upon it, therefore probably only those would enlist who would be driven to it by the most dire necessity.

We should revert to the expedient of marking in cases of desertion and ignominy however. This plan acts against the bad soldier only

and its general effect therefore must have been improvement. It was also a good preventive and a measure of mere self-protection on the part of the tax-payer against systematic fraud.

We should improve the position and advantages of the non-commissioned officers.

I have seen it proposed to do so by making regimental sergeant-majors quarter-master-sergeants and warrant-officers. I believe the plan to be a good one. The warrant rank would be much coveted. Many would prefer it to a sub-lieutenancy if they could take their choice, for they would think that they might find themselves less comfortable in the latter position, and the more expensive style of living might render them worse off, in a pecuniary point of view, than if they held warrant rank.

In the last great European war, we saw the complete break down of promotions from the ranks when made extensively, but there will always continue to be exceptional cases where the public interests are furthered by such a promotion.

It is by means of pensions that the advantages of non-commissioned officers can be most effectually and judiciously increased, and a good class of recruits attracted into the service in the hope of obtaining comfortable provision for their later years.

The soldier should be encouraged to occupy his time by learning a trade, and the regimental workshops should be turned into schools for the purpose of teaching him. It is probable that the men would feel great disinclination to the trouble if they had to do their full amount of duties in addition ; but if excused minor parades, when so employed, I believe they would gladly accept this alternative.

We would certainly reap the fruits of our trouble when they returned home on discharge, or to service in the reserves, for they would then find, and their friends also would see, that instead of being more or less unfitted for civil life by their service, they had, on the contrary, been taught industrious habits and how to support themselves.

There are many trades which might be easily taught, and there are in every regiment men capable of assisting in the work of tuition.

In England this labour would also pay well, I believe, in a pecuniary point of view, but not so in India, where native labour is very cheap.

The provision of employment for retired soldiers is another of the means at our command.

With voluntary service in the Regular Army during peace, and compulsory only to a certain extent during war, we cannot hope to procure a reserve of retired soldiers rapidly, but the men who are ob-

tained may be made of great use, by sending them to serve in the Militia of their counties, instead of forming them into a separate corps, they would thus be under better control, and be more easily found when wanted. It would also tend to connect more closely the Militia and regular battalions of a county.

By the plan of reserved pay and service in the Militia, we would with certainty retain our reserve men.

It would be understood that in cases of war they would be the first to be drafted into the Regular Army.

Evidently to throw a bad, and most probably therefore a discontented, retired soldier into companionship with the young men of the Militia, would be the gravest of blunders, but a corresponding benefit might be obtained if the example thus put before them were a good and soldierly one.

Localization and an intimate connection between the various forces of a district, are among the most likely means to be successful in encouraging voluntary enlistment.

A man should be permitted as formerly to enlist for a particular battalion, instead of as at present only for a brigade. This would give him the certainty of serving with any friends or relations he might have in one of the regiments, and also the boon of being able to select home or foreign service. The uncertainty in these matters at present may be losing us many recruits.

Drill should form a portion of the instruction at all public or Government schools, and private ones would soon follow the example thus set. At the larger ones facilities should be given for the study of tactics, military history, military drawing, and fortifications.

These early lessons would in many cases bear fruit in later years, both through practical application, and by giving men military tastes and ideas, and thus inclining them to serve in our forces.

In conclusion, I will express a hope that it will be apparent how nearly a purely voluntary system is the one I have proposed, and yet what great results in men and training it would give; and I also trust that it will be observed how the very arrangement by which these advantages are principally secured, would at the same time go far to provide the Sinews of War.

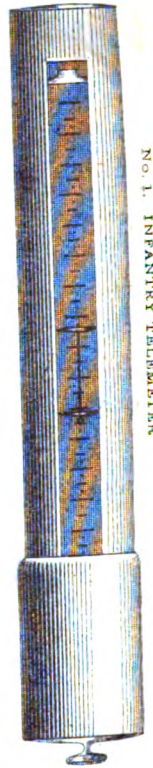
DEFENCE, NOT DEFIANCE.

TELEMETERS FOR WAR

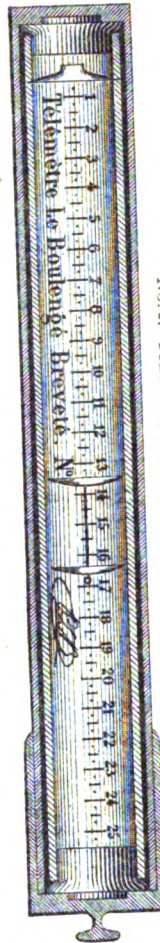
Plate 2

Actual Size

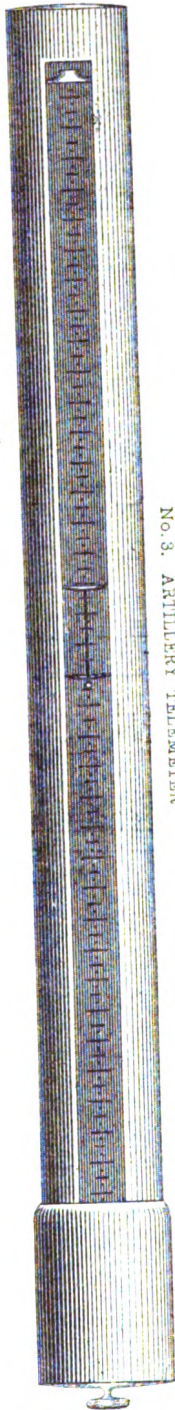
No. 1. INFANTRY TELEMETER



No. 2. FIELD TELEMETER (SECTION)



No. 3. ARTILLERY TELEMETER



Photographed at the Surveyor's Office

II.

FIELD TELEMETERS.

GENERAL IDEA.—The weapons of war which we use, cannon and rifles, requiring an elevation graduated according to the distance of the object, necessitate, as a reasonable adjunct, the use of some means for measuring that distance.

Hitherto the problem has not been satisfactorily solved; the different telemeters proposed all require some process of triangulation more or less simplified; they necessitate the measurement of a base, and the use of fixed points, and they involve certain calculations; moreover they require that the object should appear as a point, stationary and well seen, which is rarely the case in war. Therefore they have not yet fairly become practical.

For want of a telemeter the Artillery regulates its fire by watching the bursting point of its explosive shells. But to be able to apply this method successfully, it is necessary that troops on which it opens fire should be well in view and on a flat country. The slightest interposing obstacle, an undulation of the ground, a hedge, a few bushes, a field of corn, will suffice to prevent entirely the observation of the shot.

The instrument which we propose appears to us fitted to complete the weapons of war by furnishing the means of regulating exactly their elevation. It measures the distance of an enemy by the observation of his fire, by noticing the interval which elapses between the appearance of the smoke and the arrival of the sound. For this purpose it is composed (Plate I) of a glass tube graduated lengthwise in divisions which represent the distances. This tube, shut at both ends, is filled with a liquid and contains a metal runner formed of two discs united by a central shaft. The diameter of the discs is a little less than that of the tube, so that when the tube is vertical the runner descends gently with a uniform motion. The glass is protected by a copper case, provided with an opening which shows the scale and the runner.

To use this telemeter hold it horizontally in the hand, the runner lying at the end at which is the commencement of the scale, and observe attentively the enemy's position: at the instant when the smoke of a firearm appears turn the wrist quickly to bring the instrument to a vertical position, and the runner begins to descend; when the report of the explosion strikes the ear, make a contrary movement, the runner is stopped, and it is only necessary to read the division which corresponds with the posterior disc to find the distance sought.

The very simple apparatus which we have just described, and which we have adopted after considerable enquiry, is endowed with a uniform motion and works with great precision; consequently knowing the velocity of sound and that of the runner, it is easy to graduate the scale in divisions which represent exactly the distances.

An important property which we have succeeded in giving to the instrument is this, that it takes account of the variations temperature causes to the velocity of sound ; for this purpose the size and the density of the runner and the density and expansiveness of the liquid are combined in such a manner, that the velocity of the runner may be influenced by the temperature in the same proportion as the velocity of sound ; the indication of the distance therefore remains always correct.

We have adopted for the runner a velocity 25,000 times less than that of sound, consequently a millimetre on the scale represents 25 metres of distance. The degrees of the scale arise by divisions of 25 metres, and the fifth of a division which corresponds with 5 metres in distance may be estimated by the eye.

We have made numerous trials of this telemeter ; the experiments consisting in the observation of a certain number of ticks of a clock or watch, have shown us that it is absolutely correct from a chronometrical point of view ; as to the exactness of its indications of the measure of distance it depends on the skill of the observer.

In order to be able to judge of this take our repeated experience. Ten men, sub-officers and soldiers, each furnished with a telemeter, observed the fire of a rifle or of a gun placed successively at different known distances, and under the diverse conditions which present themselves in war ; from the results obtained we may draw the following conclusions :

Every soldier can use the telemeter with advantage. The accidental error which may occur with an ordinary observer does not generally exceed 50 metres ; with a little use and practice one may tell the distance within 20 or 25 metres, whatever that distance may be.

Every one has his own personal loss,* it is necessary to know this in order to obtain from the instrument all the advantage possible ; it varies a little with different observers ; it averages a loss of 50 metres on the distance, the fire being less easily observed than the sound. This average loss is corrected on the instrument itself ; for this purpose the commencement of the scale corresponds, not with zero but, with 50 metres.

It is advantageous always to use the same telemeter so as to unite with the personal loss the slight error which may exist in the graduation.

One who is just beginning may make considerable mistakes with the first shots he observes, because for want of practice he is surprised by the fire and observes it slowly.

* I am not very clear about this paragraph, but it appears to mean that as the smoke comes without warning the observer does not notice it so quickly as the sound for which he is prepared by having previously seen the smoke.

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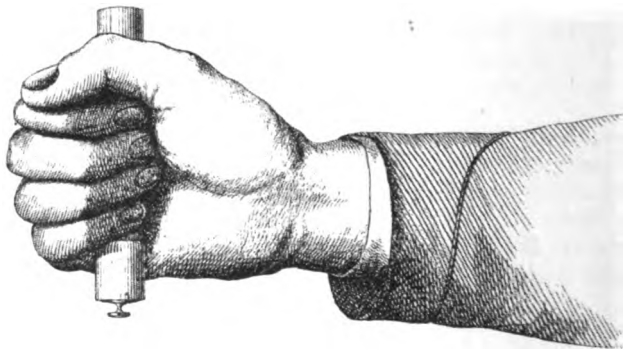
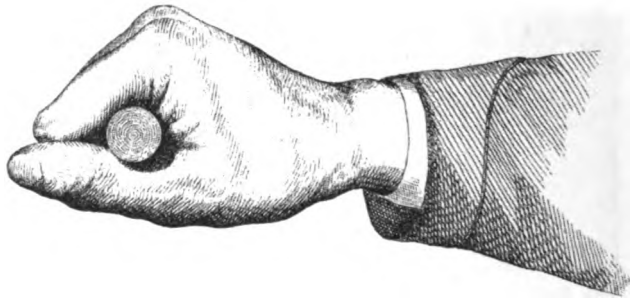
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Handling of the Telemeter

Photomicrographed at the Surveyor General's Office

N.Y.

This mistake is independent of the distance, but the personal loss diminishes with the distance a little.

The firing of a rifle may be observed with as much accuracy as that of a cannon as far as 2,000 metres under favorable circumstances ; wind appears to have very little influence on the observation ; we have not been able to ascertain its influence.

PRACTICAL RULES RELATIVE TO THE MANAGEMENT OF THE INSTRUMENT.—The instrument may be carried in the pocket, or in a case, or uncovered ; it may also be hung by a string attached to the button at the top.

To use it, hold it (Plate II) in the right hand, the arm stretched out without being stiff, the top to the right, the opening towards the body, in the fingers more than in the palm of the hand, held less towards the little finger than towards the first finger, so that on turning the wrist the tube may be as vertical as possible. To begin, turn the wrist to the left to bring the runner to the bottom where it stops ; then hold the instrument horizontally, the eyes fixed on the point to be observed mark the fire by turning the wrist to the right by a quick, but gentle movement ; mark the report of the explosion by a contrary movement, made as much as possible in a similar manner. Bring the hands towards the body, keeping the tube horizontal and open the fingers to read what distance is indicated.

Practice is required to bring the telemeter to the vertical and horizontal positions, without fumbling by a measured movement, afterwards it is done instinctively. There is however not much inconvenience from holding it a little obliquely during the descent of the runner, the error which it causes is very slight and generally inappreciable ; this is one of its great practical advantages.

If the instrument has remained some time at rest, it is necessary before using it to hold it in the hand, and to make the runner travel several times the whole length of the tube ; without this precaution it may move slightly slower ; practice has taught us this fact ; it probably arises from the liquid losing its fluidity when at rest.

The telemeter being intended to be carried in the pocket or in the hand, its temperature even in cold weather will not descend below 15° (centigrade ?) We have taken particular care regarding this in making it ; this is why we recommend its always being carried in the trouser pocket or in the hand, when it is necessary to use it in cold weather, so that the temperature of the liquid may not be lowered too much, in which case the results would not be so accurate. During summer no particular precaution is required.

DETAILS OF CONSTRUCTION.—Among the different liquids we have tried, especially water, alcohol, glycerine, and their compounds, only distilled water, with a small proportion of alcohol, fulfils the required

conditions ; this liquid may be used in combination with a very small silver runner ; aluminium and platinum have not the same advantage with respect to density and expansiveness.

Runners of different shapes have received equal trial ; hemispherical or conical discs act less regularly than the slightly convex discs which we have adopted.

That the movement of the runner may be uniform the glass tube should be perfectly cylindrical throughout its whole length, a condition which requires great care in the manufacture.

The scale is printed on paper and pasted to the face of the tube, opposite the opening ; it is seen through the liquid which forms a lens and facilitates greatly the reading by clearing and magnifying the marks and numbers. The edge of the indicating disc resting directly on the scale there is never any doubt as to what it points to, it is very clearly marked. To facilitate reading the hundreds of metres are shown by a long stroke with the number, the divisions of 25 and 75 by a point, and the divisions of 50 by a short stroke.

The scale may be constructed for any other unit of length, such as the pace, the yard, &c., as may be required.

The case is of burnished copper ; the top has a peculiar shape and is bronzed, that there may be no hesitation as to the manner of placing the instrument in the hand.

The closing of the glass tube without the introduction of any air has called for much study and many experiments. In the process adopted, the tube is closed by two india-rubber stoppers fastened in the case ; a large number of instruments made in this way have been in use for three months ; they have been frequently carried abruptly between temperatures of 60 and 10 ; and as yet there is no appearance of any air in them ; they appear fitted to last for years ; yet as it is probable that in the long run some bubbles of air will end by getting into the liquid, we have prepared for this in the following manner. A compartment is reserved for the air ; it is formed on the stopper at the bottom by a silver funnel shaped disc placed in the glass. The air shut into this compartment, cannot get out without great difficulty, while it re-enters with great ease. If then a bubble shows itself in the liquid it will suffice to hold the instrument vertically and to shake it a little as the runner descends that the bubble may pass out. We prefer, however, to leave a little air on purpose to facilitate the expansion and contraction of the liquid.

Made in this way we think we may answer for these instruments lasting at least ten years.

The tube may also be hermetically sealed, thanks to the air compartment, but we prefer the foregoing method as it gives more compactness and less length.

We have made three patterns to answer the different wants of the Army.

	Limit of indication. Metres.	Price *	
		without case	with case.
No. 1, Infantry Telemeter (to regulate rifle fire) ...	Between 1400 & 1600 m.	13 francs	14½ francs
No. 2, Field Telemeter (officer's pocket) ..	„ 2200 & 2500 m.	16 „	17½ „
No. 3, Battery Telemeter (for artillery of all kinds) ...	„ 3500 & 4000 m.	20 „	21½ „

* Agent Ch. Tillière and Co., 30 Rue Plattestein Brussels.

As yet we have kept to these three patterns, but there is nothing to prevent our making instruments for greater distances.

USE OF THE TELEMETERS.—The use of the telemeter is obvious ; on a field of battle, once the action has begun on the whole line, it is of no use ; then the noise, the excitement, the heat of the strife, the proximity of the enemy make its employment impossible. But in every fight which precedes the general engagement of large bodies, or which goes on at the same time at a distance from them, in the actions of the advance guard, in artillery engagements to gain or maintain a position, in infantry attacks against a battery, in the strife of sharp-shooters, every where in short where the action is limited, its importance becomes great and of a kind to decide the fate of those engaged.

It will be equally valuable in ships of war and in coast batteries. It is in siege operations especially, in that battle which lasts for months, where day and night the besieged gives back shot for shot to the besieger, that the telemeter will be in constant use. A battery established at a distance and completely hidden will come under the influence of all the guns within range of it from the moment when it opens fire ; its first aim will be uncertain, while from all sides they will reply with a sure aim. If for greater security it opens fire at night, its distance will only be the better known. Not only will the distance be ascertained but the elevation which suits that distance, an elevation which varies from day to day with the state of the powder and atmospheric conditions. It is sufficient indeed to reply by explosive shells of which one may observe both light and sound. If the telemeter then gives the same indications as for the enemy's fire, the shot has reached the object ; if not, it is necessary to alter the elevations according to the difference shown.

Practice only will show all the uses we have here written down, we shall just point out one more ; it is known to be impossible to ascertain the distance at which shells burst, which explode in the air and consequently to know if the fuze has been properly regulated, this is one of the great defects of this kind of projectile : it will be

sufficient to note the explosion and the sound to be perfectly informed as to the point of bursting. Without entering into other details we are convinced that the telemeter is destined to play an important part in war ; the soldier can use it as well as the officer, for its use only requires sight, hearing, and touch ; it is extremely simple, practical, and cheap ; it may be kept in damp places and even in water, without its movement being altered ; it may be broken but not put out of order, in short its indications surpass greatly in correctness all that has hitherto been attained in the matter of judging distance in war.

Liège, April 1874.

MODIFICATIONS OF THE TELEMETER.

In order to ensure to the liquid preservation for an indefinite time, the ends of the glass tube are no longer closed by india rubber stoppers ; they are hermetically sealed.

To make the instrument more portable, the weight of the brass case has been diminished by half, the glass tube is wedged in at each end by a piece of cork, which makes the whole very solid and little liable to breakage.

The button of the case has an eye in which a cord may be fixed ; this button is placed at the end where the graduation begins, contrary to that of the first pattern, consequently the modified telemeter ought to be held in the hand in the opposite way, that is, the button to the left in the waiting position, and upwards to mark the fire.

A bubble of air is left in the compartment intended for it ; it allows the telemeter to stand a temperature of 50 degrees centigrade without bursting. It is very difficult for a globule of air to leave the compartment and interfere with the movement of the runner, but as the case may occur in carrying it owing to a violent blow or jolt, it is well to glance at the instrument before using it, and if a bubble of air appears, it is enough to make it return to its compartment to hold the instrument vertically, button upwards, and give it a shake *as the runner descends*.

Further to avoid this inconvenience, it is well in carrying the instrument to keep it vertical, button upwards, or to hang it by the cord.

Liège, September 1874.

(Signed) P. LE BOULENGE

LATEST IMPROVEMENT.

The water mixed with alcohol was inconvenient.

1st. From not having sufficient fluidity, when the temperature fell below 15° centigrade, and from giving under such circumstances short indications.

2nd. From its freezing in great cold and breaking the glass.

Recent research has induced us to employ sulphuric ether which has not these defects, and which has besides very great advantages as regards regularity and correctness. With this liquid the velocity of the runner remains proportioned with that of sound in all temperatures. The indications are correct in winter as well as in summer. The telemeters which have this last improvement bear the date 1875. When the liquid thickens in cold weather, it is necessary between observations, to hang the telemeter by the cord (to a button of the tunic for example), so that it may remain in harmony with the surrounding temperature.

The ether being more expanding and more mobile than water the bubble of air is larger and more apt to disconnect itself. This is why we recommend that notice should be taken whether any air obstructs the movement of the runner before beginning to make observations. During the handling of the telemeter there is no danger of a globule of air leaving the compartment which is shut off by a double partition, it can only occur in carrying it when the instrument is turned upside down and subjected to violent shaking.

(Signed) P. LE BOULENGE.

Liège, January 1875.

Note.—The above is a translation of a description of a range finder invented by Major P. Le Boulenge of the Belgian Artillery. I have got one of the instruments (length less than 6 inches, diameter about $\frac{1}{4}$ an inch) graduated to English yards to read up to 2,200 yards. I have not yet had an opportunity of trying it, but one of these telemeters was being tried at the School of Musketry at Hythe in November last with the following results.

1. At distances less than 400 yards the appearance of the flash or smoke and the report of the explosion came so nearly simultaneously as to make it difficult, if not impossible, to use the instrument with success.

2nd. At distances beyond 1,000 yards it frequently occurred that either the smoke (of a rifle) was not properly seen or the report not properly heard, and so the necessary observations could not be made.

3. At distances between 400 and 1,000 yards, the instrument was very correct, the error never exceeding 50 yards.

With regard to the difficulty at the short distances it should be noticed that at such ranges it is comparatively easy to judge by the eye, and the trajectory being flatter than at the long ranges, a miscalculation is of less consequence.

As to the difficulty of observing flash and sound at the long distances, it only applies to rifle fire, whereas at such long ranges it would generally be the firing of big guns which would have to be observed, when there would be no difficulty.

Touching the error, sometimes amounting to 50 yards, at the medium distances, it is to be observed that practice would be likely to reduce it, and at any rate the approximation to correct judging of distance is a great advantage.

Edinburgh
1st March 1875.

A. DUNLOP ANDERSON, Capt.,
23rd Punjab Pioneers.

III.

NOTES ON THE TURKISH TROOPS IN TURKISH ARABIA,

BY DOCTOR EVATT, ARMY MEDICAL DEPARTMENT.

IN the spring of the year 1873, while travelling in the valley of the Euphrates and Tigris, we were enabled to make some notes on the condition of the Turkish soldiers in the various garrisons of that country. We saw during our journey something of the soldiers in garrison at Bassora, Bagdad, Kerbela, Nejf or Meshed Ali, and at Hillah. As these notes may contain a few points of interest to officers of the Indian Army, we submit them for publication.

2. Every one is aware that although the Turkish race was in the olden time merely a Tartar horde in the pay of the Arabian caliphs, who then held sway in Bagdad times are much changed. The Tartar servants have become the rulers and the Sultan of Turkey, although Turanian in origin, claims all the power of a Suzerain over the entire Mahometan world and particularly over the dwellers in Arabia. However to claim sovereign rights over the Arabs is an easy matter, to enforce authority is quite the reverse. Despite the numerous garrisons above mentioned in Mesopotamia and Arabia Proper, Turkish authority hardly extends beyond rifle range from the walls of the garrisons, and the Arab freebooters to-day carry on their depredations within sight of the minarets of Bagdad, and close up to the very centre and head-quarters of Turkish power in the East of the Ottoman Empire.

The Arab, possessed of little real property, and very rarely condescending to cultivate the earth, is a foe very difficult to subdue or to capture, for packing up their rude tents, and driving their herds before them they seek the shelter of the desert and laugh at pursuit. A constant warfare of more or less severity has been waged between the rulers and the ruled for centuries, and even now, although there are signs of settlement and peace, at any moment the Arab people may take fire and endeavour to abolish every sign of conquest. To maintain the possessions she already occupies and to carry on expeditions against more distant Arab regions, Turkey holds these garrisons, some of which viewed apart from mere Turkish and Arab politics, may one day occupy a prominent place in public affairs.

3. A few words on the situation of these towns may not be out of place. Coming from India the first met with is Bassora, a town of capital situation and considerable importance to-day, but the merest shadow of the once magnificent city where, in ancient Assyrian days, all the wealth and commerce of India and of Babylonia met. It is built on the banks of the Shatt-el-Arab or conjoined stream of the Tigris and Euphrates, a splendid body of water which falls into the upper extremity of the Persian gulf. Heavy freight vessels and frigates of 40

guns lie with ease off the town. Close by Bassora is the Arab town of Kowet on the Arabian shore of the gulf, destined one day to be the Gulf terminus of the Euphrates valley railway, if ever that much talked of construction is made. At Bassora there are several Turkish frigates stationed and from that garrison they now and then despatch little expeditions against the Arab settlements that can be reached from the Persian gulf shores. While we were there in 1873 troops were returning from an expedition against El-Hassa.

The town is much exposed to marsh poison from the swamps of the Euphrates, and the numerous canals that are here used for irrigation. The date gardens of Bassora are famous in the East, Moore in *Lalla Rookh* also mentions them.

4. Proceeding up the Shatt-el-Arab one comes to Koorna the traditional site of the Semitic paradise at the junction of the Tigris and Euphrates. Here entering the former river one proceeds against the stream which runs through a wide and howling desert to Bagdad.

There has always, since the very dawn of History, been a great city about this part of Mesopotamia, whether it be Babylon, Sellucia, Ctesiphon or Bagdad, but Bagdad is by far the least important city that ever occupied this central site.

Turkish misrule and Arab wildness have turned this land, the very mother of abundance, into a desert, but it cannot destroy the great strategic importance of Bagdad. This city commands the valley of the Tigris and of the Euphrates, it stand opposite the passes into Persia via Khanakin and Hamadan, it is the centre of what might be the most fertile district of the world, it is a capital base for the support of the outlying garrisons of Eastern Arabia, and troops required for operations in the Gulf can easily reach Bassora in a few days by water transport. When the day comes, as come it must, that Russia and Turkey meet for the final settlement of the latter's condition, it will surprise us very much if Bagdad be not the point of most importance in the question. Russia strong in such a place, and with the Persian Gulf open to her ships and trade, seems to be a far more important subject for us to think of than the more unlikely dangers of direct Indian invasion. One thing strikes an Englishman coming from India while travelling here, and that is what might not this land become if ruled by Anglo-Indian administrators and Anglo-Indian laws. If England had a garrison at Bagdad, the old glories of this once splendid *Doab* might again revive.

5. Fifty miles from Bagdad, across the desert of Mesopotamia lies Hillah on the actual site of ancient Babylon, and on the bank of the Euphrates, here a wide and noble river. This garrison connects the outlying forces at Kerbela and Nejf with the centre at Bagdad.

6. Kerbela and Nejf may be treated under one head. They are the advanced post of the semi-civilized Turkish rule on the boundaries of the Arabian desert and the outlying pickets of the Turkish arms against

the independent Arab tribes. In addition to this they are sacred cities in the eyes of the Shiah Mohametan sectaries.

Year by year amid great troubles and difficulties tens of thousands of pilgrims from the far off Persian interior, traverse their wild and rugged country, and descend into the burning plains of the desert to visit the burial places of the beloved Ali and of his murdered son Houssein. Ali died at Kufa a few miles from Nejf where the religious fervour of the Shiahs have reared over his remains a noble mausoleum whose golden dome glistens for thirty miles on the plains, and at Kerbela in the midst of luxurious date gardens, and in the centre of a fertile oasis in the surrounding desert, Houssein sleeps. To be buried near these holy sites is the one aim of the Shiahs, and the most familiar picture in the desert is the long caravan of camels and horses carrying the corpses of the dead Persians for burial near the beloved ones of their sect. Few Christians have visited these holy cities, but we were lucky enough to be able to do so.

7. Whatever rottenness or maladministration may exist in the civil affairs of the Turkish, or as it should be more correctly called the Ottoman empire, and there is very much, that rottenness does not extend as far as we could see to matters military. Turkey may be dead as an Empire viewed from the civil side, she is far from being dead as a military power, and now after the lapse of two years since we saw her soldiers, we still believe them to be very efficient, thoroughly well cared for, and in many ways worthy of being copied by the Indian native army.

8. The Civil and Military authority in Irak Arabi, (Turkish Arabia) centres in a *Mushir* or Field Marshal located in Bagdad, and who is called "Viceroy." During our stay in those parts Raouf Pacha was the officer holding this post, and to his kindness, and to the hospitality and attentions of Colonel Herbert, the late British Resident in Bagdad, we were much indebted for opportunities of seeing the military institutions of the Province. From what we saw of Raouf Pacha, he was as little like the old conventional type of Turkish Pacha described by Kinglake and others as anything could be.

9. He was an accomplished and agreeable gentleman, had visited all the European courts, was covered with decorations, was well informed apparently on all European questions, spoke French well, knew the system by which France was trying to civilize and to settle the Arab Tribes of Algeria, a duty very kindred to his own, and took much interest in enquiring into our condition in India and spoke of visiting this country. He personally explained the details of some rifled guns to us, discussed various questions and in numerous little ways showed himself quite up to the average of European officers in our opinion. It is strange, however, to think that while the Governor is lucidly dilating on the affairs of Europe in his cabinet, the caravans are being rifled within gunshot of his walls. Yet so it is here, everything in the civil adminis-

tration is in theory admirable and reads to perfection, but there the matter ends. In practical life nothing is done save to speculate and probably to oppress. But certainly, as far as I could see, it was not so in military affairs.

9. Some one has said, "The Turkish army is one in which the private men are excellent, the company officers passable, and the seniors contemptible," and probably there is some truth in the saying. Certainly if the officers in the higher army grades were as efficient in their positions as the rank and file are in theirs, the army would be a fine organization.

The Turkish soldier in the ranks seems quite a good fellow. Robust and hardy in physique, accustomed to the hardest fare in civil life, very probably drawn from the agricultural peasantry, always a good nursery for soldiers, strictly sober and imbued with a religious devotion to his country and the Padishah, he seems to be a man who in the hands of Anglo-Indian officers of the old Indian irregular cavalry type, might be made to do anything. They seem more intelligent by far than the average sepoy, and remind one more of the Goorkha type of soldier, some of whose Turanian blood indeed flows in the Turkish veins. They have more animation and energy, more fire and enthusiasm, than any Poorbeah soldier ever had, and we think they would take kindly to the right stamp of English officers.

The company officers are men who as a rule have passed through the ranks, and who are devoid of any high professional education. Without influence a man does not reach any high grade in the Turkie service, and the friendless captain rarely advances beyond that post. The weak point in the whole service is the frightful amount of corruption and backstairs influence that is said to be at work in the disposal of all high commands or even regimental appointments. Mere favourites, knowing little of their duties, succeed to these posts and the whole military machine is paralyzed by inefficient leaders. Had Turkey a class of higher military officials as true to her interests and as devoted to their country as is the private man in the ranks, she would be much stronger than she is to-day.

We will notice such points as seem of interest under separate headings.

10. *Physique.* The men in all the garrisons we visited were robust, stout, and hardy looking. At Bassora only, where there were many invalids returned from the expedition against El Hassa, did we see any delicate men, and here too the climate is very bad, being thoroughly saturated with marsh poison from the swamps and overflowings of the Euphrates.

The Turkish soldier walks better than the sepoy, he has more spring and elasticity in his tread, and an easier gait. At Bagdad while we were there a guard of Bombay sepoy was on duty at the Residency,

They did not, in our opinion, compare well with the Turkish soldiery. Their English pattern red tunics were too tight and constrained, their blue serge trousers far behind the easy fitting knickerbockers of the Turk, and an English Kilmarnock cap is inferior in appearance to a tasselled fez. The sepoy was more of a soldier according to the views of a bigoted drill sergeant, but in no other way. At Bagdad we noticed that a great number of the soldiers had the horrid scar of the Bagdad boil on their faces. This disease resembles the Delhi boil of India and is supposed to be induced by the water. It is most disfiguring and no one escapes it if they live in the city for any time.

In every garrison, as I will remark further on, the men were stout and well nourished; with reference to Mahometan prejudices it may be mentioned that the rank and file wear neither beard nor whiskers, their faces except the upper lip being clean-shaven.

11. *Clothing*.—The Turkish soldier is well and sensibly dressed. His uniform suits his work, and that sums up the best opinions on a soldier's dress. All ranks without exception wear the fez. It is light, portable, easy and becoming. It is worn alike by the Pacha and the private soldier, and is never removed whether at meals or on any other occasion. It is probably the last remains of the turban reduced to suit modern ideas. During the hot season, which is a severe time in these desert garrisons, the men wind a turban round the fez, and the officers adopt the Arab *Kefiya*, a striped kerchief worn open over the head and shoulders, and bound round the brows with an *agae* or coil of camel's hair rope. This head dress forms a well known feature in all pictures of Arab life. The men wear blue serge jackets cut in what we call Zouave pattern, collarless, open in front and showing the vest. The trousers are loose and easy, and end half way between the knee and the ankle, where a stocking covers the leg. In the hot season they all wear white drill uniforms, well cut, clean, and as good as what our soldiers wear when in India. The officers wear in ordinary single breasted frock coats of good cloth surprisingly well cut, and the grades are shewn by increasing bands of gold lace on the sleeve. In the summer they wear white frock coats which are becoming. No officer wore either cross belt or sash the chest being perfectly free. In the summer the men carry a white canvas pack instead of the ordinary knapsack. The men are well shod. I noted this particularly as no one can deny that the shoeing of the sepoy is still a weak point. The Turkish soldier wears broad soled very easily fitting boots of soft unblacked leather, like our Indian sambhur skin; they come high up over the ankle and lace along the side. We enquired about footsoreness and it is almost unknown. To any one who has seen the sepoy painfully walking along in ammunition boot, or on a march carrying them on the end of his musket, this is a great improvement.

The Turkish Government have established a Government clothing factory at Bagdad, and there all the uniforms and boots are made up.

We visited the establishments. The machinery is rude, but the work turned out is substantial and good. The manager, a military official, had been trained in the French factories.

12. *Arms.* We visited these garrisons in 1873. The men in all of them were armed with snider breechloaders. This surprised us, as at that time the local Indian army was armed with smooth-bore muskets and the English garrison alone had breech-loaders. The arms were we think English made. They were clean and well cared for. They were neither blued nor browned, which seems strange to English eyes; and its omission is a mistake, as a bright metallic gun barrel attracts the attention of an enemy in the field, and in the sunlight interferes with a steady aim from its dazzling effects.

Many of the men were armed with sword bayonets. They used the Snider with dexterity, and maintained a rapid fire with it, but there was no attention paid to steady aiming. The Cavalry, who are very constantly engaged with mounted Arab marauders, are armed with Remington American breechloading magazine carbines holding 14 cartridges in reserve in a magazine under the barrel. Raouf Pasha, in explaining this arm to us, stated that they stood the wear and tear of the desert life well and did not go to grief. They are imported from America.

The officers were armed with swords of the European pattern. We saw nothing of the Artillery. There are no guns on the ruined bastions of the Bagdad wall, there are none at Bassora or Hillah, but there were some small pieces on the walls of Kerbela. Any heavy artillery would, we imagine have to be conveyed from Constantinople by sea via the Suez canal and the Persian Gulf, any attempt to convey it across the rugged country that lies on the overland route from Constantinople via Diarbekir would be very tedious.

13. *Food.*—The Turkish troops in those garrisons are very well fed. Even by comparison with our Commissariat arrangements for the European troops in this country they need not be ashamed. Any person looking at the men would easily see they were well cared for in this particular. We have now before us the ration table of the Turkish soldiery. The peculiarity of it is that every grade in the service from field marshal down to private man, receives rations in kind according to a sliding scale, which gives one unit to a private and thirty units to a field-marshal.

Each unit represents a day's complete ration for a single man, and consists of bread, meat, rice, ghee, onions, salt, firewood, oil, candles and soap. Officers of the Indian Army are doubtless aware that although the Turkish soldiers are Mahomedans they are of a very different stamp from the so-called Mussulmans of India, who in many ways are mere Hindoos. In India owing to contact with Hindooism, Mahometanism, Christianity and Buddhism have all more or less become tainted with its narrow views.

All Arab and Turkish Musalmans, following the true rules of their creed eat freely with Christians, and with each other. Rationing the soldiers is thus freed from the many difficulties which attend the feeding of an army like the Indian, containing in its ranks Hindoos of various castes, Mahometans, Christians and Sikhs. Messes can be organized, any comrade can cook for any other comrade, and they have no more scruples about times and places of eating than the English soldier has. The prejudice against the hog of course exists, and in this prejudice all sensible men agree with the ideas of Moses and Mahomet as far as the East is concerned. We have constantly eaten at the same table and from the same dish with both Arabs and Turks, and no question was ever raised. We noticed that few of the Turkish officers were teetallers. They all drank wine.

The ration bread of the troops is made in the European fashion and is excellent. It is made in Government factories. The cattle that supply the meat ration come from the pasture lands that lie on the hilly country along the Persian frontier. Amongst the civil population the date in these regions occupies a very important place as a food.

14. *Pay*.—We have shewn that these soldiers are well dressed and very well fed. They are wretchedly paid. Pay day is an event of wondrous rare occurrence in a Turkish garrison. The continual drain of money from the outlying provinces to Constantinople to be squandered in the intrigues of the Seraglio renders it almost impossible to pay the lower officials. The Civil authorities doubtless do not suffer, as they "squeeze" the people they govern a little more and make ends meet.

We do not see how the soldiery can do this; of course when a man is well fed, clothed and lodged, the great pressure of life is removed from him, and the higher ranks can secure money by selling their surplus rations. Thus a Captain, who draws four sets of rations, can probably sell three of them. Stories, which if not true are very well found, are told of pashas who determined their men should receive some payment. One accordingly divided the city walls into portions and handed them over to the garrison in lieu of payment.

The soldiers soon turned the bricks into cash, and the walls nearly disappeared. Another story states that one month the entire army was paid in soap, of which commodity many tons were in store. The following are the titles and monthly pay rates of the service :—

Title.		English rank.	Pay Beshliks.	Ration units.
Netair	...	Private	5	1
Onbashi	...	Corporal	6	1
Choush	...	Sergeant	12	1
Mulazam	...	Ensign	44	1
Yuzbashi	...	Lieutenant	80	2
Bimbashi	...	Captain	290	4
Kaimakam	...	Major	300	6
Mirali	...	Colonel	600	8
Lira Pasha	...	Brigadier	1500	16
Ferik Pasha	...	Division General	3500	20
Mushir	...	Marshal	10000	30

▲ Beshlik =20 Piastres. 44 Piastres make a rupee.

15. *Drill*.—The general character of the Turkish drill resembles that of the French army before the war of 1870. This is true, although the Turkish army was modernized by German officers, Moltke himself having taken part in the work forty years ago. There is not a vestige to be seen of that wonderful smartness at his exercises which marks the German soldier. On parade and on guard the men have all the *degagé* manner that before the late war characterized the French soldiery. They drill, it not with English accuracy with twice the English rapidity; everything seems to be done at the double. They do not wheel like a gate nor march like a wall, but they deployed into line and performed various manœuvres with extreme rapidity. Both at Bagdad and Hillah they had military bands organized on the European fashion.

The soldiers salute by placing the open hand on the heart, and raising it to the head. The Turkish garrisons in these districts lead a hard life from the constant flying column duties either against hostile Arab tribes or against Arab freebooters. More wearying or less glorious expeditions a soldier cannot be employed on. To catch an Arab tribe when in full flight is impossible, and from the midst of the wide spreading desert these merciless robbers laugh at pursuit. Law and order have to-day little existence in those uncared lands. Turkish rule is so grinding, so unfeeling that it seems to desolate every spot it touches. One constant thought in this dreary land is what might it not become if under English rule and administered by Anglo-Indian officials. The old glories of that *Doab* which was once the garden of the world, might revive again. We could not, Kafirs though we might be, endure more hatred than the Arab Mussulman gives to his orthodox oppressor. It is more than a creed hatred, it is a race hatred aggravated by constant tyranny in the ruler. When going over the Euphrates to Kerbela, a man said to us,

"If any one insults you it will be because they may mistake you for a Turkish officer;" a mistake quite possible, for they are as a race undistinguishable from Europeans.

It is quite a question, whether had we in India been of the same creed as the people we rule there, we would have inherited any less hatred than we now do. European History has shewn that Roman Catholic Austria ruling Roman Catholic Italy did not mean any love between the two peoples.

Probably no nation could rule these people so well, certainly none so justly, as we could. Did we own the land of Mesopotamia and the Shiah shrines in Arabia we would have great influence over our Indian Musalmans, and there is a boundless field for emigration in the plains between the rivers Euphrates and Tigris. All that is wanting is order and irrigation. When owing to the internal commotions, the elaborate Assyrian canal system of the land began to fall into decay, it was certain the country would become a desert, and now we have the extra, ordinary example of two splendid streams rushing down to the ocean and passing almost the whole of their course between desolate desert-plains. Once let the waters enter these plains, and an extraordinary fertility must be developed. Turkish rule will never do this, to the English or perhaps some more ambitious race this task remains.

16. *Hospitals*.—The Army hospitals in the Turkish service, following the example of France, Germany, Russia, Austria, and America, are organized on the general system as opposed to the regimental system, that formerly obtained in the English service. The Garrison hospital at Bagdad was excellent, a fine double-storied, well ventilated modern structure of the banks on the Tigris. It is true that it was built by private charity for the use of the sick poor of the city, the authorities have however annexed it for military purposes, as "a temporary measure." When we with several Turkish officers visited the hospital the senior medical Officer in charge of it requested the whole party to remove their swords and leave them in an ante-chamber. It is an army custom and prevents the disturbance caused by thoughtless visitors, who come clanking through the wards disturbing every one. Of the wards there is little to say. They were quite satisfactory and the whole edifice, by comparison with the rude structures often used for the sick sepoys, was quite a palace. The sick consisted principally of fever and dysentery cases.

The medical officers were intelligent men, principally Greek and Armenian Christians. There is an imperial school of medicine at Constantinople for training these officers. Their position is good and their pay, when they get it, liberal.

17. *Barracks*.—The barracks are in every garrison substantial and fair. At Bagdad they are quite modern and very good. Large, substantially built, double-storied, deep verandahed, well-ventilated buildings,

Title.	English rank.
Nefair	Private
Onbashi	Corporal
Choush	Sergeant
Mulazam	Ensign
Yuzbashi	Lieutenar
Bimbashi	Captain
Kaimakam	Major
Mirali	Colon
Lira Pasha	Brig
Ferik Pasha	Div
Mushir	M

A Beshlik = 20 Piastre

15. *Drill.*—The ge that of the French army be borne towards the English the Turkish army was mah, and at Nejf as well as at Bagdad having taken part in to be seen of that we ening on the Esplanade that runs beside the German soldier. C and listening to the Turkish band playing, an old manner that befor and recognizing us as English essayed to converse. They drill, it not much, but placing his two forefingers together along everything seer he said "English and Turks;" then placing them like gate nor marc against one another, he said "English and Russians." various man they had m

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July 1875.

IV.

INFANTRY INSTRUCTION.

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 but notice the difference in the manner in which the shooting respec-
 tively of Infantry and of Artillery is treated. For the former, a manual of
 some 150 pages details minutely the instruction to be given, the num-
 ber of rounds to be fired and the prizes to be awarded for good shooting.
 Instructors of Musketry have their labours supervised by Inspectors,
 who themselves are under the supervision of an Inspector-General, and
 it is distinctly recognized both that good shooting is to be encouraged
 in every way, and that instruction in shooting requires the undivided
 attention of the Instructors. As regards the Artillery we look in vain
 for any similar recognition of the necessity of good shooting, there is no
 text book of Instruction, no prizes are given, and although there are
 Instructors in Gunnery they have no recognized duties in connection
 with the shooting of the batteries of their brigade.

Yet, if the conditions above quoted are to be complied with, system-
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 It is true that guns are fired as it were from a rest, and that conse-
 quently far less position drill is necessary, though a correct posi-
 tion is quite as important in laying a gun as in laying a rifle;
 but there is much more theoretical knowledge required for the former
 than for the latter, and moreover, while in an Infantry regiment each
 soldier has his own rifle and a large supply of ammunition for practice,

enclosing a large square in the centre, and capable of accommodating 2000 men easily. The verandahs are particularly deep; wider than the Bengal standard pattern for European barracks. The soldiers have no bedsteads. A sloping guard bed runs along either side of the rooms, and here the men sleep. Every soldier has a locker of his own, a capital regulation, and one much wanting in our English barrack rooms.

As we entered the rooms, the men were called to attention and stood to their places. No fault could be found with the construction of the buildings, but they were not as clean as is the general custom of the English service.

18. *Conclusion.*—We think the general verdict on the points we have considered with the exception of the efficiency of the senior grades of officers and the pay question, must be favourable. There is no doubt that an observer coming fresh from English parade grounds and English barracks, would find much fault. But coming from India and knowing how difficult it is to maintain perfect order and regularity of detail amongst Asiatics, one takes a fairer view of these Turkish soldiers.

The greatest good will seems to be borne towards the English people by all the military. At Hillah, and at Nejf as well as at Bagdad they were very civil indeed.

While sitting one evening on the Esplanade that runs beside the Euphrates at Hillah ; and listening to the Turkish band playing, an old man came up to us and recognizing us as English essayed to converse. He could not say much, but placing his two forefingers together along side each other, he said "English and Turks;" then placing them like crossed swords against one another, he said "English and Russians."

The same sentiment seemed to be very general. No nation has done more for Turkey than we have, perhaps we might have fought for a better cause.

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Umballa, *July 1875.*

IV.

ON GUNNERY INSTRUCTION.

IN a paper by the Prince of Hohenlohe-Ingelfingen, Commandant of the Brigade of Artillery of the Prussian Guard, on the employment of Field Artillery in combination with the other arms, which was embodied in a pamphlet on this subject circulated by the Deputy Adjutant General Royal Artillery in India in 1872, the following passage occurs :—" For good shooting it is necessary that the Tangent scale " should be properly understood, well adjusted, and that the gun should " be well laid. In addition to this, the gunner who lays must be perfectly calm." And further on—" The next important points are a correct " estimation of the distance, the possibility of seeing where the first " shot strikes, and the correction of the laying after the observation has " been made."

There can be no doubt, I think, that if it is desired to obtain the *maximum* effect from guns of precision, compliance with the above conditions is indispensable, but although since the introduction of rifled ordnance, no pains or expense have been spared to provide the British Artillery with the best possible weapon, it can hardly be affirmed that equal endeavours have been made to ensure the presence in each battery of a sufficient number of men, whose qualifications as marksmen are such, that the *maximum* effect may be obtained from the guns.

Any one, conversant with the regulations of the Army, can not but notice the difference in the manner in which the shooting respectively of Infantry and of Artillery is treated. For the former, a manual of some 150 pages details minutely the instruction to be given, the number of rounds to be fired and the prizes to be awarded for good shooting. Instructors of Musketry have their labours supervised by Inspectors, who themselves are under the supervision of an Inspector-General, and it is distinctly recognized both that good shooting is to be encouraged in every way, and that instruction in shooting requires the undivided attention of the Instructors. As regards the Artillery we look in vain for any similar recognition of the necessity of good shooting, there is no text book of Instruction, no prizes are given, and although there are Instructors in Gunnery they have no recognized duties in connection with the shooting of the batteries of their brigade.

Yet, if the conditions above quoted are to be complied with, systematic instruction is quite as necessary in the Artillery as in the Infantry. It is true that guns are fired as it were from a rest, and that consequently far less position drill is necessary, though a correct position is quite as important in laying a gun as in laying a rifle; but there is much more theoretical knowledge required for the former than for the latter, and moreover, while in an Infantry regiment each soldier has his own rifle and a large supply of ammunition for practice,

in the Artillery there are only six guns per battery with 50 rounds per gun yearly for the instruction of as many men as it is desired to teach. The comparative paucity therefore of means of instruction in the Artillery would point to the necessity of even more system of imparting instruction in that arm than in the Infantry.

Let us consider in detail the conditions for good shooting as laid down by the Prussian General—1st, “ that the tangent scale should be accurately understood.”

Tangent scales are graduated in degrees and minutes, and the angles approximately corresponding to various ranges and to increments of range having been determined by practice, should of course be as well known to the number 1 (the non-commissioned officer who lays the gun) as the alphabet to any one who reads ; they have also a deflection scale graduated in minutes, each minute on the scale being equivalent to a certain amount of deflection at the end of each range, the object of which is to allow for the deflection of the shot caused by wind or by a difference of level in the wheels of the gun, and for this purpose rough rules are laid down with which also the number 1 must be perfectly familiar. Now, although the elevations for various ranges have been determined, it does not follow that these elevations will always suit even approximately for each range for which they are laid down ; in the first place, guns do not always throw alike, one gun requiring more elevation for the same range than another of the same nature ; in the second, the strength of the powder sometimes varies* requiring corresponding variations in elevation ; in the third, a breeze may be blowing with or against the shot, thereby increasing or diminishing its velocity, and lastly, there may be a considerable difference of level between the gun and the object aimed at, in which case gravity will act either as an accelerating or a retarding force, and therefore necessitate an alteration in the elevation. The number one therefore, besides being thoroughly acquainted with the general rules for giving and correcting elevation and deflection, must be equally well aware how they affect his own gun, and must be prepared for any of the three last mentioned circumstances which may necessitate an alteration of elevation.

Take an ordinary case of what may be required from the numbers one of a battery in action :—when the battery is brought into action the commanding officer having indicated the object to be fired at, would give the order to load at so many hundred yards range. Each number one then, having previously placed his gun as well as the ground permits, has to lay on the object with the elevation due to that range for his particular gun, giving

* *Note.*—Of course, if owing to carelessness in the manufacture of the cartridges, or to cartridges containing powders of various strengths having been mixed up in the limbers, each cartridge gives a different velocity from the last, good shooting is out of the question, but it is not too much to expect that the cartridges should be properly made and kept together in the limbers according to date of manufacture, so that the number one would know when he came on a fresh batch.

deflection to compensate for difference of level in wheels, &c., should it be required (should deflection be required on account of wind the commanding officer would probably order the amount to be given,) the guns may therefore all be laid with different elevations and deflections in view to their projectiles striking the same spot, thus:—Say, the order is given “at 1,500 yards,—with common shell—load;” number one of No. 1 gun gives the regular elevation $4^{\circ} 12'$; number one of no 2 which throws high gives $4^{\circ} 8'$; No. 3 gun, right gun wheel lowest $4^{\circ} 12'$, and 4' left deflection; No. 4 gun throws low $4^{\circ} 16'$; No. 5 gun throws to the right $4^{\circ} 12'$ and 6 left deflection. No. 6, gun with a new lot of cartridges throws high $4^{\circ} 10''$, so that the guns are laid as under, viz.

No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.
$4^{\circ} 12' 0$ defn.	$4^{\circ} 8' 0$ defn.	$4^{\circ} 12' 4$ L. defn.	$4^{\circ} 16' 0$ defn.	$4^{\circ} 12' 6$ L. defn.	$4^{\circ} 10' 0$ defn.

When the first gun has been fired, the commanding officer, having either observed the graze himself or having received the information from some one deputed by him to do so, would call out, (say) “50 yds short,” on which each number one would at once give 8' more elevation (the amount due for 50 yds.) ; when the second gun is fired, the shot again being judged (say,) 50 yds. short, the commanding officer would call out as before, and the elevation of each gun would again be increased by 8,' the shot from No. 3 gun striking the object, the range would be determined, and the elevations for the different guns would stand as under, viz:—

No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.
$4^{\circ} 28'$	$4^{\circ} 24'$	$4^{\circ} 28'$	$4^{\circ} 32'$	$4^{\circ} 28'$	$4^{\circ} 26'$

Now, when each number 1 thoroughly understands his tangent scale and the guns are laid as above, the battery in the hands of the commanding officer becomes (provided the graze of shot can be judged) in itself a range finder, but if any number 1 makes a mistake as to the elevation which he ought to give, the whole battery is thrown out and many shots may be lost before the range is obtained: it is clear too, I think, that in action the numbers one must be trusted to give the proper elevations to their guns.

Again, Artillery has most frequently to fire at moving objects, and here not only has the number one to consider the peculiarities of his own gun and its position, but the rate at which the object is moving and the distance it will have advanced or retired in the time from the order to open fire being given until his own gun is fired; thus—suppose Cavalry are seen advancing at a trot and the commanding officer determines to open fire upon them when they come within 1,500 yds. he will give the order “at 1500 yards—with shell—load,” when No. 1 gun will be laid as before, *i. e.* with $4^{\circ} 12'$ elevation, No. 2 gun however

* Whenever details as to ammunition ranges occur in this paper they refer to the 9-Pr B. L. R. Gun which has been taken as an example throughout.

will not fire for (say) 10 seconds after No. 1, in which time the Cavalry will have advanced about 33 yards, so that 5' elevation will have to be taken off No. 2, and if each successive gun be fired 10 seconds after, it will have to fire with 5' less elevation than the one before it. So that supposing the guns to be the same as in the first example, they will have to be laid in the first instance with elevations as under, viz:—

No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.
4°-12'	4°-3'	4°-2'	4°-1'	3°-52'	3°-45'

When the commanding officer judges the Cavalry to be about 1500 yards distant, he will give the word to commence firing, when No. 1 gun will be fired, and if the shot be a good one the remainder of the guns would be fired in succession with the above elevations:—if the shot fall over or under he will call out, as judged, so many yards over or under, when the elevations will all be altered* at once as in the first example, and so on until a good shot is made, when the range will be known and independent firing might commence, each gun of course still allowing for the distance the Cavalry will have advanced since it was last fired.

Here it is plain that still more will depend on the numbers one, and their thorough knowledge of the tangent scale, and that simple in themselves as are the calculations which have to be made, to make them in the field in action, will require a great deal of previous instruction and practice.

2nd, "That the tangent scale should be properly adjusted."

Although, the principles on which adjustments are made being known, to make an adjustment is simply mechanical, yet a certain amount of practice† is necessary to ensure quickness and accuracy, and it must be remembered that a very slight error in adjustment will make a considerable difference in range.

3rd, "That the gun should be well laid."

This ought to be a tolerably simple matter, and I believe that most men can be taught to lay a gun accurately, but it must be remembered that it is necessary, not only that each gun itself should be well laid, but that all the guns of a battery should be uniformly laid, that is,

* Should the elevations have to be altered, it is evident that the interval of 10 seconds between the guns will not suffice, so that for each time it is altered an allowance for an additional 15 seconds or so, during which time Cavalry will be advancing, would have to be made.

† Not necessarily with ammunition—in fact the difficulties attending arrangements for moving targets preclude much practice at them, and I have never seen practice at targets moving towards a battery except at the camp of exercise at Hussun Abdal in 1873, when targets were floated down the Indus towards batteries on its banks—but practice without ammunition on the parade ground might be made nearly as instructive.

laid with the same amount of sight ; and it requires more time and patience than might be imagined to get every one of 20 or 30 men always to lay exactly the same. Some fancy a full sight, some a fine, some would lay on one corner of the target, some on another, but it is clear that if one gun is to profit by the results obtained by another all must be laid alike, and therefore the first thing to be done in teaching men is to see that they all lay on the same point of the target and with the same sight, and to ensure this they must all take the same position in laying, more particularly as regards the distance of the eye from the tangent sight, for a gun will always seem differently laid as the eye is far from the sight or near to it. Quickness of laying too is essential, not only because time is saved thereby, but because in action a man has generally to lay a gun after having undergone a considerable amount of physical exertion, and he is more likely to take correct aim when he aims quickly than if he were to take long over his laying.

4th, " The gunner who lays must be perfectly calm."

There is no demonstration necessary on this point, and the more causes there are to disturb a man's calmness, the greater the advantage of the duties he is called upon to perform being those with which constant practice has made him thoroughly familiar.

5th, " A correct estimation of the distance."

This seems to me to be a point which should rest more with the Commanding Officer, or some person or persons specially deputed by him, than with the numbers one, who, when working together, should never be allowed any independence as regards estimating range which should be determined for the battery under the orders of the Commanding Officer in accordance with the results of the first few shots. It is no doubt however, of great importance that judging distance should be practised by every one connected with the shooting of a battery, as out of a certain number of men it will always be found that some possess the faculty of judging distance in a much greater degree than others, and the former would be brought to the front in a regular course of judging distances : range finders would of course be used when available, but their use when time is an object, would not be likely to be advantageous under 1000 yards, and I believe there are many men capable of judging with tolerable accuracy up to that distance. If the distance were always estimated in the first instance by a reliable judge of distances, much time and ammunition would be saved, and if the commanding officer were not himself a good judge of distance, he might easily have with him a mounted orderly, on whose judgment he could depend. It is impossible to ensure that every number one should be a good judge of distance.

6th, " The possibility of seeing where the first shot strikes," and it might be added of estimating the distance of its graze from the object of attack.

This is about the most difficult matter connected with practice. When possible advantage should be taken of signallers advanced to a flank, who could estimate, better than those in the battery, the results of the trial shots. When this cannot be done the only thing is to fire very deliberately until some indication is given of a shot having told. It can generally be seen whether a shot strikes under or over the object aimed at, and by commencing to fire short, gradually increasing the elevation till a shot strikes over and then decreasing it, the range could probably be obtained after a few rounds. I believe that much might be taught in this branch of judging distance, if men were always exercised at practice in judging the effect of every shot fired deliberately, and that it would be found that some men habitually formed a much more correct estimate of the effect of a shot than others.

7thly, "The correction of the laying after the observation has been made."

This has been treated of under the first head, viz., that of acquaintance with tangent scale. The guns must of course be laid on the same spot, and when possible some clearly defined and permanent mark in the enemy's line should be selected on which all the guns should be laid in the first instance.

I have endeavoured in the foregoing paras. to give some examples of what may be required from the numbers one of a battery in action, in view to give some idea of the amount of instruction and practice necessary to bring a given number of men up to the required standard; and I would now submit the following sketch of a course for carrying out that instruction in batteries of Horse and Field Artillery; in it I have limited the men to be instructed to those possessing a certain standard of education, because I consider that the laying of a gun is a very different matter from the rest of its service, and that to get the best possible marksmen you must take men to train who have a certain amount of general education. I know that at present many steady old gunners who can scarcely multiply 2 by 2 are justly considered to be a great deal better shots than younger men with more education and more theoretical knowledge of a marksman's duties, but why are they so?—simply because they have had more practice. The things necessary to make an efficient marksman are education, intelligence, correctness of eye, steadiness and practice, and as you certainly cannot get the best possible without all, if in any man's case it is manifestly impossible to combine all, it is in my opinion waste of time to instruct him, and not only waste of time as regards himself but waste of time and means of instruction as regards others. It must be remembered that the more practice, whether in pointing and laying or in actual shooting a man gets, the better he is likely to become, and that the greater the number of men instructed the less each man can get, while the means of instruction remain the same; and I think when it is considered, that only six men per battery are required at any one time for the laying of its guns, it may be admitted that we

shall be very well off if we have these and a reserve of 18 others thoroughly instructed, both theoretically and practically. Of course the more thoroughly instructed men there are the better, but with the present limited supply of ammunition, I do not see how more can practise with advantage, and I believe moreover that in most batteries it will be found much more difficult to obtain 24 men fully qualified to commence practice, than to select the 24 from those qualified. Every gunner, if possible, should doubtless be able to lay a gun, as far as the mechanical laying which is taught as a part of the drill goes, but you can no more have every man in a battery a marksman, than you can have every man fit to command it, and a man will not lay any better, should he be required to do so on an emergency, because he has fired two or three shots annually or attended a certain number of hours weekly listening to theoretical instruction, which he was unable to understand.

Sketch of a proposed Course of Instruction in Gunnery for Batteries of Horse and Field Artillery.

1.—That a Gunnery class be formed in every Battery to be composed as under, viz :—

(1) All N. C. Officers under the rank of Staff Sergeant except any specially exempted by officers commanding Brigades.

(2) Gunners of good character with 3rd class certificates of education, who may volunteer for the course and be approved of by the officers commanding the battery.

2. These men to attend the class until they obtain Gunnery certificates, when subject to their obtaining a certain proportion of marks at monthly or bimonthly examinations, they will be excused further attendance at theoretical instruction.

(3) At the commencement of the drill season each year, all men holding certificates to be put through the undermentioned course viz :—

(a) Judging distance*———hours.

(b) Pointing and laying at fixed } 12 to 24 hours according to
and moving objects. } proficiency.

* The judging distance course should not be confined to men holding certificates, all Subaltern officers, N. C. officers and gunners should go through it, when possible, and a regular course should be laid down as for Infantry ; the distances of course varying : the course should be in two parts ; all above enumerated should go through the first part : only men holding gunnery certificates and any others showing special aptitude should go through the second, which should include the longer ranges, and inducements should be held out to men to qualify as judges of distance.

(c) Firing at known distances deliberately 12 rounds.

(a) Firing at unknown distances deliberately 12 rounds.

4. At the conclusion of this course the six best men in each battery to be selected to compete for prizes (as detailed hereafter), the selection to be made as under, viz :—

I. By the result of a theoretical examination in writing, the questions, to be the same in all batteries armed in the same way, being prepared and valued at Army Head-Quarters, and marks being awarded, in accordance with the valuation, by the Gunnery Instructor of the Division or District under the orders of the Colonel Commanding; the examination to be held for all batteries on the same day (say 2nd Feby. in India) by which date the preliminary course should be completed.

II. By the result of the judging distance practice, including judging distance when firing as described hereafter.

III. By marks to be allotted by the Instructor for proficiency in pointing and laying, (a certain amount of proficiency in this subject to be indispensable.)

5. The instruction including practice up to selection of men to compete to be carried on at Brigade Head-quarters* by the Instructor in Gunnery in batteries at out-stations by selected officers.

6. The certificates mentioned in para. 2. to be granted by officers commanding brigades † in the same manner as school certificates, the questions being prepared at brigade head-quarters by the Gunnery Instructor of the brigade, and the examinations being held monthly or bi-monthly on the same day in all batteries of the brigade; the course for these certificates to be as under, viz :—

* Batteries of one brigade at the head quarters of another to be treated as batteries at out stations in this respect, Instructors in Gunnery to hold towards batteries of brigades other than their own stationed in the same District the relative position of Deputy Adjutant General for Musketry to regiments within their circuits, acting as actual instructors only to the batteries of their own brigades at head-quarters. I would propose the appointment of a Sergeant Instructor to each battery.

† As the promotion of N. C. Officers goes by brigades, and while the guns as at present are always laid by the Sergeant or N. C. officers in charge of sub-divisions who should consequently, to some extent at any rate, be selected for their proficiency as marksmen, it would appear to me that this matter should be in the hands of officers commanding brigades rather than in those of officers commanding Royal Artillery in Divisions and districts, with whom the connection of batteries is temporary only, while a connection is always kept up between batteries and their brigade head-quarters. This need not prevent the actual instruction carried out being under the general supervision of the commanding officers on the spot: all returns of Gunnery Instruction, &c. would be forwarded through commanding officers of Royal Artillery at stations to the Instructor in Gunnery at Head-quarters for the information of the colonel commanding Royal Artillery in the District, who would forward the battery returns to their respective brigades and general returns for his district to the Deputy Adjutant General Royal Artillery.

I. Care and construction of guns and carriages of the battery.

II. Explanation of terms used in, and elementary principles of gunnery.

III. Use and construction of tangent scales, including connections in elevation and deflection.

IV. Use and construction of ammunition and implements with the Battery.

V. Fuze drill and shell instruction.

VI. Packing ammunition and stores.

VII. Construction of gun pits.

A hand book containing a syllabus of instruction under each of the above heads, and a series of questions and answers, to be printed and distributed to batteries ; it should include also the regulations for judging distance drill, and practice for pointing and laying at fixed and moving objects, and general rules for Instructors in Gunnery and regarding returns, &c.

The certificate to be given on the results of a written examination in the above subjects. Instructor to take care that the men are practically acquainted with them, before allowing them to come up for examination.

The certificate to be a necessary qualification for promotion to the rank of Sergeant, rank and file non-commissioned officers and gunners holding them to be given certain advantages.

7. The monthly or bi-monthly examination which men holding certificates will be required to attend to be the same as the examination for certificates.

8. If in any battery the number of men holding certificates at the commencement of the drill season exceed 24, a preliminary examination to be held at the conclusion of the judging distances and pointing and laying drill, when the whole of the Sergeants and all Corporals, and Bombardiers recommended for promotion, (provided all the foregoing hold certificates), together with the best of the remainder up to a total of 24, will be selected to carry out the preliminary practice and undergo the final examination.

9. Judging distance to be carried on both mounted and on foot, the men being mounted for all distances over 1000 yards, registers being kept similar to those used by the Infantry (Form D. W. O. No. 924).

10. In firing at known distances, four men having been told off to each gun, each man in turn will lay the gun, after which it will be looked over and the laying if necessary corrected by the Instructor, the

other three men at the gun will then look over it; when the gun has been fired each of the 24 selected men, together with any other specially selected for judging distances, will estimate the result of shot (so many yards under or over, and feet right or left) giving his answer to his No. 1 (or other N. C. officer told off to score) who will register it and his own as at judging distance, the correct result will then be telegraphed up by the range party, entered on the register, and points awarded for each answer according to scale. Each gun at this practice will fire four rounds of plugged shell at each of the following ranges, viz :—800 yards, 1200 yards, 1500 yards.

11. The firing at unknown distances to be carried on in the same manner as at known distances, but each of the selected men will, before firing commence, estimate the distance, and his answer will be recorded as before; one of the distances judged will then be selected by the Instructor, and the firing will commence with the elevation due to this distance; the elevation for subsequent rounds, being corrected by result of shot as judged from battery, the result will be estimated as before by each man, but the actual result of shot will not be telegraphed up from the range.* Four rounds, two of segment and 2 two of plugged shell, to be fired by each gun from each of 3 ranges varying from 800-1000 from 1000 to 1200, and from 1200 to 1500 yards; each gun will fire its twelve rounds at this practice in succession, No 1 gun, say, will commence firing first four rounds at a range, between 800 and 1000 yards, then retiring, say, to a range between 1200 and 1500 yards, and then advancing to a range between 1000 and 1200 yards, the limits of range between which they come into action not to be made known to the men.

12. *Competitive Practice.* This practice might be carried out at annual inspections of the Colonel Commanding Royal Artillery in the Division or District: there should always be two or three umpires unconnected with the battery: if possible a regimental Colonel or Lieutenant Colonel as umpire and two assistant umpires, one of whom, with the senior umpire, should be with the battery and the other with the range party. If in the case of detached batteries three Artillery umpires were not available, two officers of other branches of the service might act as umpires, as they would for the most part only have to decide on points requiring no special knowledge of Artillery, but one umpire should always be an Artillery Officer.

Each of the six men, selected as in para. 4, should be told off as number one to a gun for this practice, the proper number one of the gun, when not selected, falling in as number three while the gun is in action: each man to fire 4 rounds of plugged segment at targets representing, say, the front of a company of Infantry in column of sections, from each of 3 different unknown ranges, varying as in para. 11, the

* The result of the shooting will be made known to the men at the conclusion of each gun's practice, and points will then be awarded for the judging distance.

object being to drop the shell on the target or within a rectangle in front, the size of which should be regulated with reference to the "probable rectangles" of the guns, and the distance from the target at which a shell burst would be effective, and points should be awarded according to scale for each hit on target or graze within rectangle (ricochets to count nothing).

The umpires having selected the position in which the battery is to come into action, will direct the commanding officer to move to it at a walk, trot or gallop, naming the gun which is to fire; the other guns will come into action but will not load; 4 minutes to be allowed from the word "action" for the firing at each range, when "cease firing" will be sounded; should the gun be fired after "cease firing" has been sounded a certain number of points will be deducted from the score for every time it is so fired. Practice should be carried out so that every man may fire as far as possible under the same conditions as regards light on targets, &c.: it will not however be either necessary or advisable that the ranges at which each man fires should be exactly the same, so long as he fires 4 shots at each of 3 ranges within the limits before mentioned; two or three positions between each pair of limits should be selected by the umpire before the practice commences.

The range party should be placed in a conspicuous position at a known distance from the targets, as their appearance will enable the men firing to form a better estimate of the distance than the appearance of the targets; the distance under or over of each graze should be estimated and noted by the range party, the targets must be painted and the graze within the rectangle obliterated after each man has fired his 12 rounds.

The umpires should attach a certificate to their report to the effect that they (or one of them) had personally examined the target and rectangle before and after each man's shooting, and that the points were correctly awarded, that the distances at which the battery came into action were to the best of their belief unknown to any one connected with the firing until after its conclusion, and that the limits of time had in no case (or in—cases) been exceeded, in the latter event particularizing the number of cases and the number of points deducted from the score for each case.

13. The remainder of the practice ammunition* to be expended by officers commanding Batteries in firing at unknown ranges at targets representing Infantry skirmishers, guns in gun pits, &c. &c. Care should be taken that at all practice the drill as laid down is strictly adhered to; it is not uncommon at present to see great looseness of drill when a battery goes to practice.

* 24 rounds segment shell, 36 rounds common shell, 24 rounds cases.

14. Before the commencement of the annual practice, the ammunition with which it is to be carried on should be carefully examined, and the cartridges and projectiles weighed and gauged, any under or over the prescribed limits of weight or size being rejected or in the case of cartridges fired at the case firing. If possible the same brand of powder should be used throughout the practice, but at any rate the same brand should be used from each gun at preliminary and competitive practice, and the brand or brands with which the practice is carried out should if possible be specified in the reports.*

15. In the preceding paragraphs the number of rounds to be fired at the different practices has been regulated in accordance with the scale at present laid down, but if this should be increased, I would propose that segment and common, as well as plugged shell, be fired at both preliminary practices, and I would also increase the number of ranges fired from at the preliminary practice at known ranges.† A yearly competition between batteries under their commanding officers at unknown ranges, and against time, might also be added to the practice, it would be a far better test of the general efficiency of a battery than the individual performances of six or any other number of marksmen; the details of the contest might be somewhat similar to those mentioned in para. 12.

16. In paras. 4 and 6, I have alluded to prizes, and to advantages to be gained by men holding certificates. Should funds ever be available for the expenditure necessary in connection with these, I would propose that the best shots of a brigade (all batteries being armed alike) and battery of artillery respectively, be treated in the same manner as the best shots of a battalion and company of Infantry, and that all rank and file N. C. Officers and gunners holding gunnery certificates (vide para. 6) should wear a distinguishing badge and receive 1d. a day additional pay. I would also propose that badges and prizes be given to the three best judges of distance in each battery.

T. R. DISNEY,

Captain, Royal Artillery.

* I am aware this cannot be done at present, as cartridges have generally not marks by which they can be recognized, and cartridges containing powder of different brands (different dates of manufacture) are mixed up in the ammunition boxes of most batteries: but cartridges might easily be marked before being issued from the arsenal, with a number or letter which would decide the brand of the powder with which they are filled, an explanatory memo being sent with the invoice and kept as a battery record until the cartridges it referred to were expended.

† All men holding certificates might fire, and the preliminary examination mentioned in para. 8 might be dispensed with.

V.

NOTES ON THE ADVANTAGES OF THE CONTINUOUS AND MORE GENERAL PRACTICE OF GYMNASTICS IN THE BRITISH ARMY, AND ITS PRACTICAL EFFECTS.

Submitted for publication in the papers of the United Service Institution of India, by a well wisher to the Institute.

ALTHOUGH considerable attention has of late years been directed to the instruction of Gymnastics, &c., in the British Army, yet only a very small portion of the Non-commissioned Officers or men, and a still smaller percentage of the Officers, have as yet been through any course; and in most cases the whole subject is looked upon as a bore, a waste of time, and only another means of the many now found, by those who desire it, of getting away from regimental duties.

Its full appreciation is left to the few athletes, be they officers or privates, who look on the thing with keenness, who like it, or who know to what an extent, appetite, health, chests, arms, and muscles, increase and develop from its continuous though limited practice; and to the medical officers who know how such exercises increase health, strength and vigour, and who on these grounds alone would advocate that every man, woman, or child over 10 years of age would be better for 5 minutes daily exercise, on the parallel or horizontal bars; and it is this short course, before or after the ordinary daily parade or stables, that is to be advocated as a preliminary for all ranks throughout the Army.

The soldier should not only content himself with the satisfaction that his bodily health and strength are benefitting by this artificial exercise, but reflect further, that any day on service, in the ordinary course of his profession, whether in escalading a fort, surmounting a wall or palisade, getting over a barrier, crossing a ditch on a plank or beam, or swarming up a mountain side, he may be enormously accelerating the performance of his duties, even if the apparent and otherwise impracticable nature of the obstacles may be entirely overcome, by his keeping up a very short daily course of Gymnastics. Then again on the occasions of rendering assistance in extinguishing fires, or on boardship, &c., one, half educated athlete performs all, whilst twenty other volunteers anxious to do much, are forced to become passive spectators, in scenes where life may be at stake.

Whether it be on service then, or in more peaceful though not less heart-stirring scenes, the foot soldier, be he of the regular line regiments or reserves, the garrison artillery man or Militia, the Sapper and Miner, or Marine, or the private of the Army Service Corps, is a stronger and more effective man, and a more able servant of his country, if he be an athlete; the mounted soldier if he be a Cavalry man, when at an outpost, or when sent dismounted to occupy a detached position, or village, &c., may have to swarm up walls; and the mounted Artillery

man with his spiking party may be called on to do any or all of these, or may have to gallop forward to repair a bridge or gangway for the passage or embarkation of his guns or horses ; and if he can in the hour of need cross a scantling over the waterway without risk, or climb a leg of his shears or gyn without loss of time, he is at once a better and more useful soldier, for he gets over the work more expeditiously, and at the same time safely, and the duties of the Army would progress much quicker, than it could do with the ordinary man, who whilst being taught the necessary functions of running and rifle drill, writing and arithmetic, should also be daily exercised for a short time in Gymnastics. The first cost to Government of erecting bars, &c., outside every barrack, would very soon recoup itself in the diminution which must accrue in the numbers annually invalidated, to say nothing of the deaths, all of which necessitate expense in replacing.

To any one who reads the advance of the Russians in masses at Inkerman the various sorties at the Tchernaya, &c., and the fact that each column was headed by numbers of men, carrying poles, planks, small bridges, ladders and tools, it will be known how their facilities of overcoming obstacles helped their advance, and though ultimately driven back they continued without apparent hesitation or check, until at the Tchernaya they bridged and crossed that river in their advance, rapidly threw footways over the aqueduct until then looked upon as a serious military obstacle, swarmed up the Fediachine heights and were in the midst of the French Camp before proper dispositions for their resistance could be made by the Allies ; the secret of all this being the high state of perfection to which the Russian Army is exercised at Gymnastics ; and the fact that if it meets with obstacles, the men know, having been instructed, how to get over all ; and are thus able to ignore the ordinary bridges and fords, where pickets might check them, or guns enfilade and oppose their passage.

Then again, when the fire broke out in the park of the right British siege attack before Sebastopol, not far from the windmill, then used as a magazine and in which vast supplies of powder were stored, in the midst of the live shells exploding round him, a gallant young English officer burst through the sparks and smoke, and clambered up the wind mill ; supplied from below, he encased the building with wet blankets, and saved the supply of powder ; had he not been an athlete, however much he may have desired to assist, he could not have done so.

In Russia, for the instruction of each corps in Gymnastics, there are horizontal and parallel bars, leaping poles, swing ropes, &c., at their own barracks, on which all officers and men are taught to vault, leap, and swing, under every possible circumstance ; and when corps are massed together at their camps, these exercises are put into a practical shape, and they have grouped together there, a series of walls, para-

pets, palisades, ditches, military obstacles, poles, ropes, ladders and swings, &c., over, on to, and about which the whole of the regiments are worked daily, and at length, in marching order with arms and accoutrements on, until all are proficient.

The following account of the Russian Field Gymnasium, in the camp near Warsaw, may be of interest in illustrating what is now advocated :—

“ On the completion of the two week’s extended manœuvres, and “ after visiting “Modlin,” the works of the Nareef, &c. we attended “ to see the gymnastics.

“ The Gymnasium was a very large open one for the general use of the troops in camp, and was unlike anything we met with in Austria, Prussia, France or Sardinia ; it was comprised on a bit of common sandy ground, about 300 yards square, surrounded by a small 2 feet ditch to keep cattle out, a few miles out of Warsaw. At one end of this square, was erected with rough wood, a castellated front of about 100 yards in length, with three tall wooden towers rising from it ; the centre octagonal tower being about 35 feet high from the ground, with 12 feet sides, and the flank towers were about 26 feet high and 14 feet square ; these were connected to the centre by wings about 18 feet in height on the top of which was a platform of beams about 10 feet broad ; against the length of this front were placed inclined planes, rope and wooden ladders, prongs of ladders attached to the uprights, supporting the wing platforms, swing ropes, swing, fixed and moveable poles, up all of which the men eventually climbed, and thus effectually tried every nature of Gymnastics.

“ In the solid boarded faces of the flank and centre towers, small niches were cut to represent spaces where half bricks had been removed, and slanting poles, fixed and moveable, leant against the crest of the work.

“ The front of this castle on either side was continued past the flank towers by earthen parapets, with sod revetments and ditches 10 feet deep and 18 feet broad in front ; the ditch on the left of the work had a strong palisade in the centre ; that on the right of the work had a similar palisade at the foot of its sloping escarp.

“ There were three lines or columns of fences or military obstacles leading up towards this castellated front, and opposite each series of these, columns of Infantry carrying their arms and accoutrements, were drawn up, ready for the advance at a double, each having between it and the castle front its own particular works to be passed and overcome.

“ Advancing towards the keep, the obstacles on the right commenced about 250 yards in front of the left of the works to be stormed, and the rest was merely a ditch of about 18 feet wide, with a perpendicular bank

of about 8 feet drop on the taking off side. Many of the men, rushing at this, cleared it in their bound, others alighted in the sand on the landing side.

"(2.) The second obstacle consisted in running up an inclined plane about 20 feet broad made of thick deal planks, leading to a platform of wood 4 feet broad at top, and 10 feet from the ground; most of the men got up this in a run, and on arriving there jumped off, in many cases without touching the platform with their hands, on the sand below, and only one or two of the bayonets fell out.

"(3) The 3rd obstacle was intended to represent a half sunken battery with small palisades at the foot of the interior slope on the banquette; the men jumped on to the crest and with a stride, most of them cleared the palisade and banquette on to the sandy bottom below.

"(4) The fourth obstruction was merely a ditch of about 24 feet broad and 6 feet deep, with a perpendicular bank on the taking off side, and a palisade 6 feet high in the ditch, about 5 feet away from the foot of the perpendicular escarp; the men jumping this cleared the palisades, and landed on the sandy bottom; here they crouched until light poles were brought up with which to clear the next and last obstacle on this flank.

"(5) The fifth and last defensive work which had to be got over, consisted of the field parapet, of about 6 feet high flanking the work, with palisades of 10 feet high in the centre of its ditch, which as before mentioned was 18 feet wide and 10 feet deep. This obstacle was crossed by 62 men bringing up thirty one light 30 foot poles; balancing these on their upraised arms, and swinging them methodically, they darted them across the ditch; across these single poles a great many of the men crossed balancing themselves as they did so with their rifles, which they unslung before crossing; those first over then placed three or four of these poles together forming a foot way, and thus enabled the whole of the men to get over without any hitch."

"(1) The centre column of obstacles consisted of first, a ditch, about the same as described as the first in the right series.

"(2) The second was a three Gun Battery or cavalier, with three imitation wooden guns, mounted en Barbette on a rampart about 12 feet high, firing over a 15 foot parapet, the work consisted of a front about 25 feet long, with two short flanks of about 10 feet; there was a ditch round the front of this about 8 feet deep and 20 feet broad at top, with revetted escarps and counterscarps. This work was supposed to be only assailable from the front, and to escalate it unbreached, they brought up a rough wooden bridge or gangway of planks, about 30 feet long, and 3 feet broad; this platform had three poles or handles by which the men bore it along. At one end of this platform, the front

was attached to a rough truck with a pair of wheels. This machine was borne over the ground at a rush, the wheels went down the counterscarp with a bound, crossed the bottom of the ditch, and half way up the escarp when they dropped back into the ditch again ; the impetus thus given to the platform bore the front of it over, the frame of the truck now forming the arms of levers or beams, on the principle of a black parallel ruler, until at length the front of the gangway fell on to the exterior slope of the parapet, the rear end resting on the edge of the ditch, thus forming an Infantry bridge which the men quickly crossed ; overthrew and rendered unserviceable the guns and their carriages and then proceeded onwards.

"(3) The third and next obstruction was merely a stiff post and rail about $3\frac{1}{2}$ feet high with stiff wattle work in between ; many of the men jumped this clear, the others crept through.

"(4.) The fourth obstacle was the frame work of a wooden bridge composed of long sleepers, about one foot square, resting on trestles of about 10 feet high. Eight long round baulks, about 30 feet long and 8 to 10 inches in diameter, sloped from the ground on either side of what was supposed to be the banks of a river on to the trestles ; a space of about 16 to 20 feet in the centre of the bridge was supposed to have been broken away and was deficient ; the men walked up the sloping baulks to the edge of the fractured bridge, balancing themselves with light fir poles as they did so, then shoved these across to the far side, when a few men pushed across, placed the poles together and thus speedily formed a good foot way.

"The centre column of Infantry then advanced on the castellated front, and swarmed up its sides up the rope ladders, poles, ropes, &c., and a few men climbed the flag staff on the keep and flank towers.

"The left column, consisting of about the same strength as the others, viz. 150 men, then advanced in sections, by rushes over the following things :—

"1st. A ditch with perpendicular bank on the taking off side, as already described, and then advanced on

"2nd. what it is concluded was intended to represent a wall of about 8 feet in height composed of wooden planking of rough timber, about one foot broad and 2 inches thick, nailed against wooden posts ; over this most of the men leapt with leaping poles which they left behind for the others to use ; some of the men vaulted, others clambered, but all got over this barricade.

"3rd. The third fence was a post and rails, interlaced with wattles as already described in the centre series of obstacles.

"4th. The next and fourth fence was a ditch with palisades, corresponding to the 4th fence on the right side.

"5th. The fifth and last obstacle was the parapet and ditch on the right flank of the castle front, similar to that described as on the left flank and forming the fifth check met with by the right column of attack ; only with this addition, that " trous de loup " were on the glacis leading up to the counterscarp, and the palisades in the ditch, in place of being in the centre, were at the foot of the escarp ; this ditch and palisade were eventually passed by poles being brought up and hurled across on to the palisade and Berm, in the same way as the right column effected its crossing."

This brought these exercises to a conclusion, but it was observed that during the attack, the men thoroughly trained took every advantage of the different objects to obtain cover for their advance, from behind which they occasionally opened a steady, slow fire on the besieged.

The practice of making men engage in these exercises fully armed and equipped, appeared excellent.

The subject of Gymnastics has alone here been treated on, as one branch of Athletics so needful to the soldier, but fencing, singlestick, swordsmanship, boxing, swimming, the swimming mounted on horseback, teaching soldiers to ride and get across a country by paper chasing, &c., are all pursuits that should be followed up when the monotony of the goose step or Rifle instruction, Riding school or Gunnery, the sword, lance, or bayonet exercise require a rest and change ; and when the day of trial comes, and the tactics of the General require individual or combined feats of duty or daring to be accomplished, those men will be best fitted for the carrying out such deeds, who may have been kept up to a regular training in athletic pursuits.

R. H. A.

VI.

JEZAIL EXPERIMENTS.

OFFICE OF DEPUTY ASSISTANT ADJUTANT GENERAL FOR MUSKETRY,
7TH CIRCLE.

26th January 1875.

MEMO. No. 112.—Considering it might be useful to test carefully and publish the shooting power of the Jezail, the weapon which would principally be opposed to a British Force in warfare on our North West Frontier, and believing that erroneous ideas regarding its range and accuracy exist, it was proposed to procure some good specimens, test them by shoulder firing and then send them to Dum Dum where they could be fired from machine rests.

The Chief Inspector of Musketry approved of the idea, obtained the sanction and co-operation of the Ordnance Department, and wrote to the Commissioner of Peshawar on the subject, who kindly obtained from the neighbourhood of the Khyber two of the best weapons which the tribes possess, together with specimens of powder and bullets and a powder measure.

The Jezails are of the well-known pattern, small irregular bore, seven grooved, deep rifling filed into the bore, with no particular design as to form or depth, old English flint locks, a patch pierced with two holes as backsight ;

Weight of one 9 lb. 6oz. length of barrel 3 feet 8½ inches.

„ other 11 „ 2 „ „ „ 3 „ 10 „

Exact measurements of bore, of depth and pitch of rifling, were not made, as it was evident from the rudeness of the manufacture that nothing could be learned from them ; the bullets, intended to be spherical, were badly cast, some beaten into shape ; the powder of the description usually made by natives without the appliances and knowledge of the subject considered necessary by us.

The supply of ammunition was too small and too rude to allow of exact method of experiment, it was therefore determined to make suitable bullet moulds and to use English service rifle powder, and thus ensure the same charges both at Peshawar and Dum Dum, and reliable results.

The Jezails and their ammunition, together with the powder measure, were sent to the Commissary of Ordnance, Peshawur, who examined the powder (his report is attached), made bullet moulds, weighed the various charges given by the powder measure, and made up three sets of cartridges with English powder, containing respectively 2, 4, 6 drams, representing the light, medium and heavy charge shown by the powder measure.

The course of experiment originally decided on was to fire five rounds of each charge at 100, 200, and 300 yards, at the regulation target for experiments, from off a sand bag rest, and in the usual lying down position in which the hill men fire.

The firing took place on the range of the 29th P. I., with Colonel Gordon's permission, who with Captain Beddy kindly assisted; sipahis, skilled shots with the Snider, enlisted from the neighbourhood from which the Jezails were obtained and accustomed to the use of like weapons, fired the rifles, which they stated were good specimens of the best native manufacture.

Result of firing, English powder.

Distance	rifle	2 drams	4 drams	6 drams
100 yards {	No. 1	·99	·84	1·16
	No. 2	1·17	1·41	1·79
200 yards {	No. 1	...	two misses	four misses
	No. 2	...	three misses	three do.

The men after firing at 100 yards, stated that the medium or 4 dram charge suited the rifles best; they judged apparently from the recoil, and as with the light charge of 2 drams, the weapons appeared very weak, it was decided to fire only the 4 and 6 dram charges at 200 yards; at this range the shooting was so bad that it was considered useless to go to 300 yards.

The Jezails were again tried, on another day, with the powder sent in with them and with bullets cast in the moulds made in the arsenal; the men after a trial shot decided on firing with a charge of 150 grains or about 5½ drams.

Result of the practice.

Rifle	100 yards	200 yards
No. 2	1·82	3·52
No. 1	1·26	2·43

The claim of these weapons to accuracy being ascertained, it was decided at Colonel Gordon's suggestion, to test their range; the firing

commenced at 800 yards, English powder 6 drams, the men being instructed to try their best to hit even the butt ; at this range it appeared that the bullets could not be made to reach the butt, they were seen to strike the ground at about 400 yards from the firing point ; the result at 700, 600, 500 was the same ; at 400 yards one bullet struck the butt, at 300 yards one hit the target, two the butt.

The result of the experiments would appear to prove, what was originally thought regarding these weapons, that they have neither accuracy nor range ; their shooting at 100 yards is quite equalled by the Snider at 500 yards, and that at 200 yards is inferior to the Snider at 700, and the Martini Henry at 1000 yards ; both these rifles have fair accuracy beyond the ranges mentioned, whereas the small spherical bullet of the Jezail is quite lost at 300 yards .

The men firing appeared to believe in the weapons familiar to them, and had the advantage of training unknown to the Frontier Tribes ; a proof of the careful way in which they fired was given by the frequent catching in its half bent of the tumbler in the act of firing,

The Jezails are retained pending further instructions as to their disposal.

W. MACKINNON, MAJOR,
D. A. A. G. for Musketry 7th Circle.

ORDNANCE DEPARTMENT.

PESHAWUR ARSENAL OFFICE,

26th January 1875.

TO THE D. A. A. G. MUSKETRY 7TH CIRCLE.

The specimens of Native powder received in the Arsenal with the Jezails, show as may only be expected, a very low standard of manufacture.

Judged in comparison with our own powder, they exhibit every fault that powder is capable of showing. The grains are of uneven size, mostly spherical in shape, of a decided black colour, and from the amount of dust, in the small specimens sent, the powder is evidently of a soft and friable nature.

The appearance of the powder would therefore lead to the conclusion that it is made with an excess of charcoal and insufficiently pressed ; in its deflagration therefore its action would be slow and weak, and the residue would be large.

The only test possible here is the flashing test, and on flashing a small quantity, a black residue was left which would condemn the powder according to our service standard.

JAMES COLQUHOUN, Captain, R.A.,
Commissary of Ordnance.

COPY.

ARSENAL FORT WILLIAM, *May 12th, 1875.*

To

CAPTAIN LAMB, *Royal Artillery, Commissary of Ordnance.*

SIR,—In accordance with Deputy Inspector General of Ordnance's, No. 830 of 5th instant, I have the honor to report on the construction of the two Jezails received from the Superintendent Small Arm Ammunition Factory, Dum Dum; as they are somewhat different in construction, I will call them Nos. 1 and 2.

No. 1.—Length of barrel 3 feet 10 inches.

Weight of barrel 7lbs. 6ozs.

Sighted to three distances, supposed to be for 1, 2 and 3 hundred yards.

It is rifled with 7 grooves, with a pitch of one turn in 6 feet.

The depth of the rifling is .02" except at muzzle for half inch down (where it deepens to muzzle to 0.6") width of grooves .08".

The diameter of the bore is as near as possible .5, it is very irregular, and the muzzle is bell mouthed for half an inch.

No. 2.—Length of barrel 3 feet 8 inches.

Weight of barrel 5 lbs. 8ozs.

Rifled with 7 grooves, with pitch of one turn in three feet, or nearly $\frac{1}{4}$ turn in the length of barrel.

Width of grooves .08."

Sighted to 3 distances.

Diameter of bore .5, very irregularly bored and like No. 1 bell-mouthed.

The depth of grooves are similar to No. 1, being also deeper at muzzle.

Neither of the barrels are straight, and the workmanship is very inferior. It should be stated in case it is intended to experiment with these arms, that the breech of No. 1 is very badly screwed in, scarcely holding it in. No. 2 is better, but very rudely fitted and not calculated to stand much of a charge of powder.

I have, &c.,

(Signed) G. STANTON,
Civil Chief Master Armorer.

NOTICE.

MEMBERS of the institution who have not already done so, are earnestly requested to pay their arrears of donation and subscription, either to the Corresponding Members at their stations, or direct to the Secretary at Simla.

Some members still owe their donation and three years' subscription.

Officers who may wish to become members, are requested to be kind enough to forward their donations and subscriptions at the same time as they express a wish to join the Institution, and also to inform the Secretary whether their subscription is intended to be for the current year which ends on the 31st May 1876.

Members can pay their subscription to the Alliance Bank, Simla, if more convenient, and the Bank will grant receipts for any money sent.

The entrance fee is 5 rupees and the annual subscription 5 rupees.

Members on changing their addresses are particularly requested to notify the change to the Secretary, in order that delay in forwarding the Journals may be avoided as much as possible.

The address book is corrected up to date from the Army Lists, but mistakes are occasionally unavoidable unless members themselves promptly notify their change of residence.

Members proceeding to England on leave, who wish the Journal to be forwarded to them while absent from India should inform the Secretary, and send stamps for the overland postage by Brindisi or Southampton as they desire.

When a member appears in orders for leave to England, his Journal is not despatched unless he asks for it, and while absent from India his subscription is not payable unless the Journal is supplied.

Members on return from furlough can obtain the numbers of the Journal that have been published during their absence, by paying the subscription for that period, and all members on returning to India should inform the Secretary of the fact at once.

The Secretary will be happy to send an Index to volumes I, II, III, and IV to any member wishing for the same.

H. H. STANSFELD, LIEUT-COLONEL,

Secretary.

ORIGINAL PAPERS.

I.

HIS EXCELLENCY GENERAL THE RIGHT HO'NBLE LORD NAPIER
OF MAGDALA, G. C. B., G. C. S. I.

Commander-in-Chief in India, in the Chair.

PARIS IN 1870-71.

A lecture delivered at Simla on 1st July 1875.

By

LIEUTENANT R. C. HART, R. E.,

Asst. Garrison Instructor.

ON the 15th July 1870 France declared war with Prussia. On the 6th August, that is to say, within three weeks, both wings of the French Army were defeated by the allied Germans. The left wing after the battle of Forbach retreated rapidly on Metz; the Germans catching it up as the last divisions were crossing the Moselle, at once engaged with it, and the French throwing away their advantage ordered several divisions to recross: such a movement might have been imperative had its object been to secure the safe passage of the army, but Metz was a fortress whose works forming a double bridge covered the passage of the river without the aid of a rear-guard action: thus by this battle, called the battle of Borny or Courcelles, the Germans on the 14th August delayed the French army to such an extent, that they were enabled to head their retreat, and, so confident were they of their fighting superiority, that they fought two more battles in both of which in a strategical point of view, their armies were most critically exposed.

The battle of Mars-la-Tour or Rezonville was fought on the 16th August, and Gravelotte or St. Privat on the 18th August, resulting in nailing to Metz the army which had been commanded by Bazaine since the 12th August.

Bazaine at Borny had contented himself with a half-measure; at Rezonville he had been duped into developing his whole army; at Gravelotte both armies faced their lines of retreat, so the battle was necessarily a decisive one: throughout we see how little the French appreciated the true military situation.

Now to return to the right wing under MacMahon ; a division of this corps after a well fought action on the 4th August was driven in from Weissemburg.

On the 6th August MacMahon took up position at Worth to bar the passages of the Vosges: the Crown Prince unintentionally found himself involved in a general action : the French fought with most conspicuous gallantry against heavy odds, but sustained a decisive defeat ending in a complete rout, a few stragglers fled to Strasburg, but the mass of the army retreating in utter disorder did not halt till it reached Chalons where an army was being organised under General Trochu.

Political considerations influenced all the military movements, the people were deceived as to the true state of affairs and precious time was wasted.

On the 6th August the telegraph informed the Government at Paris, that the Army of the Rhine had sustained a signal defeat; from that moment it must have been evident that Paris was threatened: therefore energetic steps should have been at once taken to put the capital in a state to resist a siege or rather investment, but the ministers dreaded a revolution and therefore continued to deceive the people. Political considerations moved the army from Chalons to the relief of Metz instead of its falling back on Paris as was urged by all the generals.

Trochu was sent to command in Paris, and the army set out on that fatal march which terminated in Sedan, where on the 1st September the French Emperor with 80,000 men surrendered to about 200,000 Germans; nor could he do otherwise, his strategical and tactical position being very inferior and the Germans at the same time morally and numerically superior.

The French being decisively defeated, peace would have been well timed; but there was no one in France who dared to make a disadvantageous peace; therefore war was declared *a outrage*. The Germans immediately after Sedan marched on Paris. On the 4th September the Empress fled and a revolutionary Government installed itself under the name of the Government of National Defence; it was composed of moderate republicans, who however made use of the red or communistic element as an instrument to raise themselves to power, and therefore felt the necessity of taking Rochefort into the Government (he had just been released from prison by the mob).

The state of France on the 4th September was indeed deplorable; the only army that remained to her being hemmed in and unable to do more than hold in check a force of the enemy: the Government was composed of men completely new to their work; men who had had no previous training undertook not only to rule the country, but to direct the military operations.

The German armies marched rapidly on Paris; meanwhile trains were running night and day to provision the city: redoubts were being

thrown up; the fortifications were being put in a state of defence and naval guns brought in, battalions of Gardes Mobiles were arriving from the provinces.

On the 18th September the last train left Paris from the St. Lazare station: from this date we may say that the city was completely invested.

General Vinoy had marched a corps to reinforce MacMahon, he was however too late for the battle of Sedan and therefore countermarching from Mezières returned to Paris by forced marches.

On the 19th September Vinoy and Ducrot made a feeble attack on the German advanced guard south of Paris, resulting in the French being driven in and the plateau of Chatillon occupied: the importance of this defeat was great in a material and moral sense: by this action the Germans secured a good road of communication with Versailles which they could not have used, had the French persevered a little longer, held the position and completed the redoubt of Clamart which at this time fell into the hands of the enemy. The French should either have pushed the attack home with vigour or have left the Germans unmolested: the moral effect of their defeat told seriously on the whole population as well as on the troops. The ignorant masses at once expected a bombardment and possibly the Government shared their fears, because instructions were at once issued as to the precautions to be taken; we must suppose that the general impression was that siege guns could march as fast as the advanced guards had done, but the Government was principally composed of lawyers who could hardly be expected to know very much of the military administration of their own army, much less that of the enemy.

It will not be out of place now to consider Paris in a military point of view.

A glance at the map shows the Marne and Seine uniting close to the south-east ramparts; the Seine then flows through Paris dividing it into two nearly equal parts.

Paris is situated in a basin, and with the exception of the high ground on the north and east, namely, Montmartre, Belleville, Butte de Chaumont, Menilmontant and Charonne, the whole of the city is overlooked by the heights on the south, west and east. From the island of Billancourt to Asnières the left bank of the Seine is considerably higher than the right: below Saint Denis the right bank commands the whole of the flat and open country in the Mont Valérien loop.

Paris is surrounded by an enceinte, nearly pentagonal in form. Between the enceinte and Paris proper, are the communes or parishes which did not belong to the old city, but have been annexed for tactical reasons; building has been but sparingly allowed in this zone. Paris contains numerous libraries, museums, public buildings and military

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establishments, namely, the Polytechnic, Staff College, Hotel des Invalides and L'Ecole Militaire.

Paris was the seat of government and contained an important arsenal and private workshops of all kinds.

Notwithstanding that the city seems built for pleasure rather than business, its manufactures and commerce are most important. The population within the enceinte was probably 2,000,000, including about the following garrison :

- 15,000 Sailors and Marines.
- 70,000 Experienced in arms.
- 100,000 Gardes Mobiles of the provinces.
- 30,000 Parisian Gardes Mobiles.
- 260,000 Garde Nationale Sédentaire.

Total 475,000 men, and about 80 Field and Mitrailleuse Batteries.

The French authorities differ amongst themselves as to the actual numbers. Many new guns were added during the siege. Paris contained stores of petroleum and other combustible matter, yet we may say that the city was fireproof in consequence of the little wood work, and the numerous precautions taken to extinguish fires.

St. Cloud and the neighbouring houses were all burnt, however, not by shells but purposely by the Germans after the great sortie on the 19th January, in order that the French might not again make use of it in the event of another sortie penetrating so far. Neuilly and Issy, during the Commune War, were under fire for many weeks without any conflagrations.

When the German troops arrived before Paris, people were discussing the possibility of so gigantic an undertaking as an investment, but a precedent already existed in Metz. Our books on Fortification taught us that the besieging army must be 5, 6, or even 7 times the strength of the besieged garrison, but the German leaders had thoroughly considered and studied the events of the war of 1866, and were well aware that the power of loading rapidly and from a reclining position had altered all preconceived ideas on the relations between the besiegers and the besieged ; it had become easy for a few men under cover with an open field of fire in front of their position, to repulse the direct attack of a very superior force ; therefore it became important to clear the ground in front of a post and remove everything even obstacles to the advance of the attack should they offer the slightest cover to the enemy ; the Germans were therefore enabled to hold with a few men those positions which were unsuited for the advance of sorties, while they massed their troops where it was favourable for such advances. A sortie is in these days attended with great difficulty, 1st,

because it is necessary to make a purely direct attack with no chance of operating on a flank. 2nd, because the increased range of artillery and musketry gives the besiegers every chance of bringing a cross fire on their assailants. The Communes above referred to, form a zone about a mile wide; some of them require description.

Montmartre is a hill 426 feet high and about 100 yards broad at the summit; in consequence of numerous quarries its slopes are precipitous so that it can only be approached from the south or side next Paris. On the N. E. the plateau of Belleville is about 360 feet high and from 300 yards to a mile broad; it is covered with houses and gardens.

The hill of Chaumont is 377 feet high.

The heights of Montmartre and Belleville are divided by a valley.

The Seine, leaving Paris at the Point-du-Jour flows N. and N. E. forming a natural wet ditch.

In 1814, when the Allies had seized Montmartre, Belleville, Menilmontant and Chaumont, Paris surrendered; but in 1840, these positions were taken in by the enceinte which M. Thiers built round the city to the extent of nearly 22 miles. The longest diameter of the enceinte from the Point-du-Jour to Villette is $7\frac{1}{2}$ miles, the shortest is $5\frac{1}{2}$ miles.

A military road runs round the inside of the ramparts also a railway, which must have been of great value in effecting a concentration of troops.

The ramparts are of the bastion trace, and constructed on straight lines which are nearly in the same direction on each side of the Pentagon; the bastioned fronts do not therefore efficiently flank each other, and are exposed to the danger of being enfiladed. The bastioned fronts are formed on exterior lines of about 385 yards in length.

There are 94 bastions, in some of which there are cavaliers to fire into places which otherwise would be screened from fire.

The enceinte possesses a scarp of 32 feet, formed of rubble masonry, faced with a soft white limestone in courses of from 8 to 10 inches thick.

The ramparts are of solid earth, a ditch about 80 feet wide and a counterscarp 20 feet high, consisting of an earthen slope of 45 deg., the scarp is much exposed to view.

The ramparts were well supplied with bombproof cover.

Between the enceinte and the detached forts is a zone varying from 2000 yards to over 3 miles wide; all the detached forts are connected by a good military road; the distance round being about 32 miles.

The south of Paris is defended by five strong forts, of the bastioned trace, viz. Forts Issy, Vanves, Montrouge, Bicetre and Ivry.

Between Bicetre and Montrouge is a stream called the Bievre, which has cut out a considerable valley. The five forts just named, command the five great roads leading into the south of Paris.

The forts have scarps 32 feet high, counterscarps 20 feet and ditches about 81 feet wide ; the forts contained barracks but they became untenable when the bombardment commenced, however, casemates existed. The forts were very strong, but being constructed to meet the requirements of 30 years ago, were too close to the city ; to remedy this defect six redoubts were commenced in the middle of August at the following places :—

No. 1. At Montretout.

No. 2. On the E. of the valley of Sevres, called Les Petites Bruyères.

No. 3. Above Clamart.

No. 4. South of Villejuif, called Hautes Bruyères.

No. 5. Moulin Saquet.

No. 6. Between Vitry and the railway.

The first three named were abandoned in an unfinished state, but they were so far completed that they might have offered a successful defence.

If the French had held Montretout they could also have retained the Bouzanval Ridge, and therefore have had the power of operating on Versailles, which was not only the head quarters of the investing army, but also that of all the German armies operating in France, and contained the king, princes and leading statesmen.

The valley of Sevres is a defile in which there is a first class road. To the east was Les Petites Bruyères, which with the redoubts at Montretout and above Clamart would have covered the assembly and advance of sorties, and made Versailles unsafe for the head quarters. Even had the French retained but the redoubt above Clamart, sorties might have been made on to the plateau of Chatillon, which would have caused constant anxiety at Versailles, and the great road running east from Versailles by Villacoublay would have been lost to the Germans : as it was, their line of communication had to turn south before reaching Choisy-le-Roi, in consequence of the redoubt near Vitry which commands it ; the German line therefore crossed the Seine on pontoon bridges at Villeneuve St. Georges, the permanent bridge having been blown up by the French, who destroyed their bridges in the most reckless manner. The redoubt of Hautes Bruyères, Moulin Saquet and Vitry remained in the hands of the French and did good service.

The country south of Paris is undulating, with numerous villages, chateaux, gardens and good roads.

The space between the Seine and the Marne is well defended by Fort Charenton.

The high ground on which is the Bois de Vincennes ends precipitously towards the Marne on the south and east; the ridge running out to the S. E. in a peninsula is closed by permanent works.

The east of Paris is almost impregnable by reason of the excellent positions occupied by the forts on salients of the plateau which slopes very steeply towards the enemy; it is much quarried and in parts quite inaccessible.

During the siege the French threw up a redoubt on Mont Avron, which attracted much attention, but when the Germans opened fire it was almost immediately abandoned.

Fort Aubervilliers guards the flat and open country between Fort Romainville and St. Denis; the latter position is well defended by three forts.

The formidable fort of Mont Valérien defends the west of Paris, it is situated on an isolated hill and is about $4\frac{1}{2}$ miles from Fort Issy.

The country west of Paris is very undulating and covered with vineyards and woods with occasional chateaux.

The guns of Mont Valérien ranged as far as Bougival and St Cloud; the Mont Valérien peninsula was further strengthened by earth works.

The forts were armed with the heaviest naval guns, ammunition and warlike stores were in abundance. Paris was supposed to possess upwards of 2000 guns exclusive of those in the forts.

Fort Mont Valérien is 445 feet above the Seine; it contained 76 heavy guns and a battery of Mitrailleuse, a garrison of 1500 Gardes Mobiles and 700 Sailors, the calibre of some of the guns was about $9\frac{1}{2}$ inches.

The German lines were from 41 to 46 miles in extent, the force that invested Paris in the first instance was composed of about 122,000 Infantry, 24,000 Cavalry and 622 guns.

The city was completely invested on the 18th September.

We must now pass on to the 31st October; on that day the Reds or Communists made a stir in Paris and actually made prisoners of General Trochu and the Government as they were sitting in the Hotel de Ville, detaining them for some hours till rescued by the 106th battalion. This daring but feebly sustained exploit was led by M. Flourens; it is the first we hear of the power of the Commune. The insurgents escaped and were not brought to trial, but M. Flourens having the audacity to show himself in public soon afterwards, he was seized

and imprisoned ; but the Government appears to have feared the Communists and took no steps to crush them.

During the siege numerous democratic clubs were started promulgating the most poisonous doctrines and preparing the way for the acceptance of communistic ideas.

We must pass over the exciting events connected with the German siege, because it is with the second or French siege that we propose to deal.

On the night of the 21st to 22nd January 1871, the Communists again showed their talons ; they liberated Flourens from the prison of Mazas and marched on the Hotel-de-Ville, where shots were exchanged, the Communists being driven off with a loss of about 40 killed and wounded ; this disturbance occurred while Paris was undergoing the bombardment which commenced on the 5th January and continued till the 27th January, during which time only 97 were killed and 278 were wounded by the shells, and the moral effect soon ceased ; however this was not the case elsewhere, with the exception of Belfort, Bitsche and Phalzburg, the German bombardments being most successful ; the effect being to demoralize the garrison through living in the constant fear of death, and to cause the civil population to exert pressure on the Governor, who too often allowed himself to be influenced.

On the 27th January an armistice was signed, and the forts handed over to the Germans ; thus ended one of the most gigantic of the military operations that have left their mark in history. The investment had lasted $4\frac{1}{2}$ months.

On the 1st February provisions began to arrive.

On the 12th February the assembly met at Bordeaux.

On the 19th February, just one month before the outbreak of the civil war, M. Thiers became chief of the Executive.

On the 26th February peace was signed, and by the terms, the Germans were in a few days to evacuate the forts on the south and west of Paris. About this time occurred an incident which was very significant of what would follow ; a sergent de ville was seized by some of the Reds, and in the presence of many thousands of people was thrown into the Seine, pelted with stones and drowned ; there were boats on the river and no doubt many present who disapproved of the act, yet there were none with sufficient courage to initiate a resistance ; it was for a similar reason that afterwards a minority succeeded in bringing about the Commune.

On the 1st March the German Army entered Paris, occupying the Champs Elysées and the right bank of the river, as far as the Point-du-Jour. The Germans marched out of Paris on the 3rd March.

During the occupation, the Communists took off to Montmarte and the Place-des-Vosges the guns that were parked in the Place Wagram, on pretence that they were dangerously close to the German troops : at the same time a magazine in Villette was pillaged and barricades were commenced on pretext of resisting any attempt to occupy the whole city. One might have supposed that the Government knew something of the Commune by this time, but no steps were taken, and it was at M. Jules Favre's urgent entreaty that the National Guards were not disarmed. What was this mysterious Commune under whose orders fought the immense army that held Paris for $2\frac{1}{2}$ months against the rest of France ?

There was more ignorance about it in France than anywhere else ; it was there confused with the International.

The International is a Society that denounces capital, free trade, and division of labour, and considers the confiscation of land a necessary measure ; but there must always be employers, or in other words, capital to find work for the employed.

The Society would crush all private enterprise and bring about an universal revolution with everyone working, not for himself but for mankind ; this would be very well for nations, could they agree to become republics on the principles of certain species of ants or even could the world of nations act in a similar way, but when individual interests are so opposed, how can the International expect nations to have common interests. Their folly is the more apparent when, with such ideas, they advocate the abolition of free trade.

The ideas of the working classes are formed from the papers they read and from the lies they are told by the stump orators ; many believe that half the world is composed of capitalists and landowners, and the other half of working men on starvation wages.

National Societies have long existed, but it was not till about 1839 that the first was heard of an International Society ; it was at first very moderate and did not propose being political.

However, in 1847, Dr. Marx, a German, issued a manifesto that the immediate aim of the Communists was " the overthrow of the rule of the capitalists by the acquisition of political power." " The practical measures suggested as applicable in the most advanced countries were—the abolition of private property in land, centralization of credit in the hands of the state by means of a national bank, centralization of the means of transport in the hands of the state, national workshops, the reclamation and improvement of land on a common plan, and the gratuitous education of all children."

In 1860 a trade union with Mr. Odger as chairman, took for its motto " United we conquer."

In 1864 an International alliance was formed, Mr. Odger then stated that want of systematic communication between the industrious classes enabled the employers to crush them by threatening to bring over Frenchmen, Germans and Belgians.

The International was at first governed by the moderate members who proposed truth, justice and morality as the basis of their conduct towards all men, without regard to colour, creed or nationality, and considered themselves but the medium of communication and co-operation between working men's societies in different countries, and their aim the protection, advancement and complete emancipation of the working classes.

In 1866 the tone of the society was more political than heretofore but it only mustered about 600 members, and owed £20, however people exaggerated its numbers very greatly.

The persecution instituted in France soon raised the International to 3000 members and the violent party triumphed.

It is said that in the beginning of 1870 there were 200,000 members, and in 1871 500,000.

The International now assumed an altered programme, and declared for "Atheism, the abolition of all forms of worship, the overthrow of all hereditary privileges, the substitution of science for faith, of human law for divine law, and the abolition of marriage."

The French workmen pay one sou a week.

The International is now supposed to number several millions in Europe.

It was clearly brought out during the Communist trials, that the International was not the secret spring that worked the Commune of Paris, and really had nothing to do with it, but probably now all Communists are fused into the International.

Out of 80 members of the Commune only 17 belonged to the International.

Now to return to the guns taken off by the National Guards.

The Government made a feeble attempt to retake them; had they been more determined they would have succeeded.

On the 18th March a surprise was successful, and the guns on Montmartre were seized, and some of them taken down from the hill; but strange to say the horses intended to remove them did not arrive; the National Guards assembling hemmed in the troops, many of whom fraternised with them; General Lecomte was seized and later General Clement Thomas, who had commanded the National Guards throughout the siege; other officers were made prisoners.

The two Generals were led up Montmartre, placed against a wall and shot, in order to appease the mob who thirsted for their blood.

The insurrection went on apace but no energetic measures were taken to stamp it out.

On the 19th March we knew by the proclamation, that it was the *Comite Central de la Garde National* which was the prime mover of the insurrection ; they convoked Communal elections, after which they proposed to give up their power, having as they said, liberated their master the people. The bills proposing the elections for the 22nd March were signed by twenty members, only two of whom were generally known, Assi for the strikes at Creuzot and Lullier, an officer who had been dismissed the Navy for his radical opinions.

The Military force at disposal of the French Government was composed of a few Regulars scattered over Paris ; Gardes Mobiles of the departments, the Gendarmes of the Imperial Guard and some *Sergents de ville*.

M. Thiers having no confidence in his troops marched the whole force out of Paris ; this act of the French Government seems strange indeed ; surely there were some of the troops to be depended upon, and why were the forts allowed to fall into the hands of the Commune ?

40,000 men were assembled under General Vinoy at Versailles, but they were insufficient to cope with the insurrection ; therefore application was made to the German Government for permission to augment the force ; a request that was at once granted. On the 21st March an unarmed procession, carrying a banner on which was written "*Ligue des amis de l'ordre, vive la République*," promenaded about Paris in the *arrondissements* unfavourable to the Commune ; emboldened by its success this puerile parade was renewed on the 22nd ; and had the imprudence to attempt to cross the *Place Vendome*, where the insurgents had established their military head quarters : the procession was fired on and routed, and no more was heard of the men of order, who without arms had attempted to overawe a successful insurrection.

Admiral Saisset had been made chief of the National Guards in place of General D'Aurelle de Palladine, all the National Guards opposed to the Commune rallied round him, his head quarters were in the Grand Hotel : he resigned on the 25th March and dismissed the National Guards, at a time when it is said 27,000 determined men held the 1st and 2nd *arrondissements* and the St. Lazare railway station. All resistance now ceased in Paris and the Commune reigned supreme.

The state of affairs was as follows. The Communists held the whole of Paris and the forts on the S. with the redoubts, also Fort Vincennes, but Charenton and the forts on the E. and N. were in the possession of the Germans ; Mont Valérien alone was garrisoned by the Versailles troops. The Commune possessed an immense force of artillery, and all

the necessary munitions and warlike stores that had been prepared for the siege.

The army of Versailles was weak in artillery. Now was the time for the Communists to have marched on Versailles, the occupation of which would probably have been the signal for insurrections in all the great cities of France ; but the want of union and a leader caused this project to be postponed till it was too late for success. The Central Committee at this time forced the Bank to lend them a million francs.

During the siege the Government had allowed each National Guard 1 fr 50 c. a day, and the Commune continued the grant ; the result was that many marched in the Commune ranks in order to secure a subsistence.

The Commune probably mustered 130,000 men.

Paris is divided into 20 arrondissements, each of which is governed by a mayor.

The elections were postponed till the 26th March, when about 80 members were elected.

On the 29th March the Commune held its first sitting, and appointed ten committees which corresponded with the usual departments of government, religion and marine only being omitted.

Of the members of the Commune, a few were men of the moderate party, some acted under conviction that they were right, but the majority were desperate men, who headed a war of those who had nothing to lose against those who had every thing ; they were ready to commit any crime in order to attain their own private advantage.

Flourens, Felix Pyat and Blanqui, who had been concerned in the previous riots were elected.

Delescluze, Cournet and other members of the National Assembly being elected, sent in their resignations to Versailles.

Jourde became Minister of Finance, and it is said carried out his duties faithfully.

Raoul Rigault was a sort of head of police ; he was called Minister for General Security ; he was one of the most desperate of the gang, he brought about the seizure of the hostages, and it was before him that the Archbishop was taken.

The Commune held its sittings in the Hotel-de-Ville.

On the 2nd April, the Communists were driven from the Rond Point de Courbevoie by a party of Gendarmes.

A march on Versailles was now announced, and on the 3rd April it set out in three columns, one taking the direction of Clamart under

Eudes, the second by Bas Meudon under Duval, and the third under Bergeret was to operate by Mont Valérien and Rueil.

Now the Communists counted on Mont Valérien being betrayed to them as Vincennes had been on the 22nd March, but the night before the commandant had been changed unknown to the Commune.

The advance began in the early morning with bands playing and all in good spirits at the idea of so easily marching on Versailles. Mont Valérien remained silent, and all seemed well till the National Guards got within a few hundred yards of the fort, when it opened fire on them causing the most complete rout.

The other columns were also repulsed, Duval one of their best men was taken and shot, Flourens a man they could ill spare was also killed, but the fort of Issy covered the retreat on the south; the commandant was General Cluseret, he had served in the French Army as an officer in the Crimea, had taken part in Garibaldi's wars, had fought in the American War and was destined, it is said, to take Command-in-Chief of the Fenians.

Meudon was now occupied by the Versailles, and the redoubt above Clamart fell into their hands.

The Commune offered the command of their armies to Garibaldi, who excused himself, but wrote them a letter that they would have done well to have profited by; he advised them to choose a good man, to put confidence in him and he would soon surround himself with trustworthy and able subordinates. Cluseret became Minister of War.

Hostages were seized, the Commune declaring that for every one of their men executed they would shoot three. Now began the first reign of terror, people supposed to favour the Versailles Government were watched, and no one knew when his turn might not come: the Archbishop with many others was arrested, people fled from Paris in numbers: this was easy to do by St. Denis, for Paris could not be completely invested, being open towards the German lines: however, the Commune forbade the exit of horses which they requisitioned.

On the 12th April the Commune announced that they would level the Vendôme column, which they described as an insult offered by the conquerors to the vanquished, an odious monument of false glory, a monster of ambition, a symbol of despotism.

Complimentary elections took place on the 16th April, Menotti Garibaldi was elected but declined to take his seat.

Raoul Rigault now instituted a permanent court martial, any one suspected of reaction was brought before it.

This court was presided over for some time by the unfortunate Colonel Rossel, who had just resigned his commission in the French Army.

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Early in April the Versaillais were in occupation of the Chatillon plateau, the terrace of Meudon and the position of Breteuil, Montretout, Mont Valérien and the high ground of Courbevoie, and on the right L'Hay, Thiais and Chevilly.

The Commune held the southern forts, Hautes Bruyères, Moulin, Saquet, and the banks of the Seine as far as Asnières.

The Versaillais Gendarmes next dislodging 400 Federals from the barracks of Courbevoie, soon after crossed the Seine and maintained themselves in the outskirts of Neuilly: in these operations both sides suffered heavy losses: the fighting in Neuilly was most obstinate and continued to the last, with the exception of the short armistice brought about in order to enable the wretched non-combatants to leave the place, where they had been for weeks confined to their cellars. Asnières still remained to the Communists who repulsed with loss an attempt on the Chateau Becon. The Versaillais however occupied Bois Colombes, Colombes and Gennevilliers, and after a second obstinate assault, the Chateau Becon fell: this was the key to Asnières, but much hard fighting had to take place before this latter place could be taken.

Cluseret now divided the military command into two sections. The first under Dombrowski, a Pole, who had served in the campaign in the Caucasus, and later in the Polish insurrection, a man of undoubted bravery and who did his duty in the cause he embraced: he commanded from St. Ouen to the Point du Jour.

The second division under Wroblewski extended from the Point du Jour to Bercy.

These two commands were each divided into three sub-divisions; Dombrowski had his head quarters at the Chateau de la Muette, Wroblewski at Gentilly.

All the forts were armed and placed in a state of defence, and an unsuccessful attempt was made to regain the Plateau of Chatillon.

The Versaillais now opened a heavy fire on Forts Issy and Vanves and occupied Les Moulineaux; and after a few days the insurgents evacuated Fort Issy; this disaster caused Cluseret to be arrested and imprisoned by order of the Commune. Rossel now became Delegate of War; he was a man of great ability, had served in the late war and attracted the attention of Gambetta and wrote as follows with reference to his nomination:—

“Citizens, members of the executive commission, I have the honor to acknowledge the receipt of the order by which you entrust me provisionally with the functions of Delegate of War. I accept these difficult functions, but I have want of your most complete and decided co-operation, in order not to succumb under the weight of circumstances.”

Rossel immediately re-occupied Fort Issy, which the Versailles, fearing it to be mined had not occupied : however they continued their plan of cutting it off from Vanves, but not without their working parties suffering heavy losses : they however surprised 300 Communists at night in the railway station of Clamart and bayoneted them all.

Since the 9th April, Rossel had directed the operations on the south.

On being made Delegate of War, he issued the following orders :— Dombrowski to hold himself at Neuilly and to direct operations on the right bank. La Cécilia to command between the Seine and the Bièvre, Wroblewski to command the left wing. Bergeret and Eudes to command brigades of reserve. Rossel had only been in office about a week, when finding he could not get his orders obeyed, he sent in his resignation ; this combined with the fall of Fort Issy caused him to be arrested.

The loss of the fort had a most discouraging effect on Paris ; of course the usual French cry of “ trahi ” was raised of the Commune,

Colonel Rossel was only 28 years of age ; he had served in the French Engineers, was a man of restless energy and acted throughout from conviction that he was doing right ; his letter to the Commune depicts the true state of affairs at the time it was written :—

Paris, 9th May 1871.

“ Citizens, members of the Commune—

“ Entrusted by you provisionally with the functions of Delegate of War, I feel myself incapable of bearing any longer the responsibility of a command where every one orders and where no one obeys.

“ When it was necessary to organize the Artillery, the central committee of Artillery deliberated but determined on nothing : after two months of revolution, all the working of our guns rests on the energy of a few volunteers, whose number is inadequate. On my arrival at the Ministry, when I attempted to bring about the concentration of the different arms, the requisition of horses, the arrest of the refractory, I asked the Commune to increase the powers of the local municipalities. The Commune deliberated but came to no decision.

“ Later the Central Committee of the Federation offered almost imperiously its co-operation with the administration of war. Consulted by the Committee of Public Safety, I accepted this co-operation in the most complete manner, and I gave up in favour of the members of this committee every information that I possessed of the military organization. Since that time, the central committee has been deliberating, but has not yet known how to act. During this delay, the enemy was making on Fort Issy adventuresome and imprudent attacks, which I should punish if I had the smallest military force at my disposal.

"The garrison, badly commanded, became frightened, and the officers deliberately expelled from the fort Captain Dumont, a man of energy who came to command them; and whilst deliberating they evacuated their fort, after having foolishly proposed blowing it up, a thing more difficult for them to do than to defend it.

"This is not enough; yesterday, whilst each one ought to have been at work or under fire, the chiefs of legions were planning in order to substitute a system of organization different to what I had adopted, in order to make up for the improvidence of their authority, always unsettled and therefore badly obeyed. There resulted from their conventicle a project, at a time when we wanted men, and, a declaration of principles at a time when we wanted acts.

"My indignation led them to other opinions, but they only promised me for to-day, as the limit of their efforts, an organized force of 12,000 men with whom I undertake to march against the enemy. These men were to be assembled at half past eleven, it is now one o'clock and they are not ready; and instead of being 12,000, there are only about 700, which is not at all the same thing.

"Thus, the impotence of the Artillery Committee hindered the organization of the Artillery. The vacillation of the central committee of the federation clog the administration; the pitiful distractions of the chiefs of legions paralyze the mobilization of the troops.

"I am not the man to give way before difficulty, and yesterday whilst the chiefs of legions were discussing, the party for their execution awaited them in the court yard. But I do not wish to take alone the initiative in an energetic measure, alone to saddle myself with the odium of executions that it is necessary to make in order to draw out of this chaos organization, obedience and victory. However, were I protected by the publicity of my acts and of my want of power, I could remain in office. But the Commune has not had the courage to face publicity. Twice already I have given you necessary elucidations and twice in spite of me you would have the secret committee.

"My predecessor was wrong to struggle in the face of this absurd situation.

"Enlightened by his example, and knowing that the power of a revolutionist consists only in the purity of his cause; I have two courses to choose from: to overthrow the obstacle which shackles my actions or to resign.

"I will not overthrow the obstacle, because the obstacle it is you and your feebleness. I do not wish to usurp the sovereignty of the people. I retire and I have the honor to demand a call at Mazas."

(Signed) ROSSEL

Every one must regret that a man like Rossel should have adopted such a cause as that of the Commune : he was arrested, but made his escape, only however to be afterwards taken and executed by the Versailles.

The committee of public safety referred to in the above letter was an executive committee with absolute power to pry into the proceedings of all the other commissions ; it had been carried by the violent members and became a terror to Paris.

Newspapers were now suppressed wholesale, but some 20 organs of the Commune flourished.

Delescluze succeeded Rossel as Delegate of War.

M. Thiers at this time addressed a proclamation to Paris, it was suppressed by the Commune who issued a counter proclamation. M. Thiers offered to spare the lives of all who would lay down their arms, and said he would not bombard Paris, but would only open a gate and promised to continue the subsidy to necessitous workmen.

M. Thiers' house was pulled down by order of the Commune.

The Versailles now occupied Meudon, Sèvres, Rueil Courbevoie, Becon, Les Moulinaux, LeMoulin Saquet, and boasted of having captured 150 guns and 2000 prisoners.

The fort of Vanves soon followed the fate of Issy, but fighting still went on in the villages of Issy and Vanves.

A battery was established on the Island of St. Germain, that silenced the Communist gun boats which had sheltered themselves under the railway bridge.

A bold attempt to turn the left of the besiegers' lines by St. Ouen was repulsed.

The Versailles Government had been making every effort to bring guns before Paris, many heavy guns were brought from the fleet and on the 8th May they were enabled to open fire from 70 powerful guns from what were called the Montretout Batteries. An incessant fire now played on the Point du Jour and on the Western gates of Paris.

Cluseret was released from prison on the 15th May ; he now urged the Commune to prepare an interior defense ; his idea was to defend the Place de l'Etoile, Place du Roi de Rome called the Trocadero, and the Place d'Eylau, as strategical positions of great importance and further the Place Wagram ; the confined space between the Porte de Passy and what one calls the Porte de Grenelle was to be barricaded.

The strategical strength of such a defense is shewn by the map, but the importance of the Place d'Eylau seems over-rated. The besiegers

advanced their trenches rapidly, but the ramparts were very little damaged and backed up by an organized defense in rear could long have withstood the Versailles.

Fort Montrouge covered the left of the proposed interior defense. But Rossel even had not convinced the Commune that acts and not words were required: and so invaluable time slipped by. Meanwhile the Artillery duel continued and enormous shells went hissing into Paris day and night.

On the 16th April the Vendome column was pulled down, it was 132 feet high, and had been erected by Napoleon 1st to commemorate the glorious campaign of 1805, which had ended in Austerlitz. The Commune declared that they would have no monuments erected, but in memory of glorious conquests in the field of science, labour and liberty, such were the words of the men who were so soon to burn libraries and scientific collections.

The map is drawn with the intention of showing the great strength of Paris in the hands of any but thoroughly disorganised troops. The emperor had almost rebuilt the city, the object was political, because precedents shewed that Paris always led French politics, a revolution in Paris meant a revolution for the French nation; immensely broad avenues or boulevards now intersected Paris in such a way that they could be swept by the fire from certain strategical points where great barracks were often established and Artillery and mitrailleuses being at hand, even a general rising could be divided into fragments and beaten in detail, and to make it the more difficult to construct barricades asphalt was fast replacing the stone pavements. The builders of Paris had however never calculated on the possibility of the revolutionists possessing Artillery. The map shows the arrangement of the principal streets only, the unimportant being omitted.

On the 17th May the whole of Paris was alarmed by a tremendous explosion which turned out to be the Cartridge Manufactory Avenue l'app. The Commune cried out treason, but it was the result of an accident.

On the 21st May the besiegers had sapped to within a few yards of the ditch of the enceinte at the Point-du-Jour, when they received notice that the position was not guarded; finding that the battalion on duty at the Point-du-Jour had actually deserted their posts to seek shelter in the vicinity, General Douay marched his men into Paris, and now commenced a seven days' battle in the streets of the city.

On crossing the Point-du-Jour a party working rapidly to the left opened some of the gates of the western ramparts: while another party crossing by the Auteuil Viaduct, whose defenses they had turned, opened the gates of Issy and Vaugirard. On the night of the 21st General de Cisse's right flank faced the Railway station of Montpar-

nasse. Meanwhile Vinoy had taken the bridge of Grenelle and advanced along the ramparts as far as the Porte-de-Passy.

It is possible that the cry of treason raised by the Commune was not unfounded, because considering the stubborn resistance hitherto made by the western defenses, notably the Porte-Maillet and Neuilly, it seems suspicious that so little resistance was now made, it was even less than at the Point-du-Jour.

At 4 p. m. Douay entered Paris, and was followed in the next few hours by the other corps. MacMahon moving his Head Quarters from Mt. Valérien to Boulogne ordered the Generals to push for the strategic positions neglecting unimportant defenses.

The Trocadero was the first position that it was important to capture, because then it would be possible to operate against the Place de-l'Etoile.

On the right the Place-d'Enfer and the Carrefour-de-l'Observatoire were the objective points.

On the 21st May no important position was taken, but the two bridges connecting the right and left attacks were tolerably secure.

The relative heights of certain important positions were as follows :--

Trocadero	213 feet	} Mont Valérien 520 feet.
Place-de-l'Etoile	190 "	
Place Wagram	141 "	
Montmartre	420 "	
Buttes de Chaumont	331 "	
Cemetery of Père Lachaise	315 "	

These were the commanding positions of Paris.

The part of the city occupied by the Versaillais at midnight on the 21st is shewn by the shaded portion of the map.

On the 22nd at 5 a. m. the strong position of the Trocadero was captured by a surprise, the defenders believing it to be impregnable, had not taken ordinary precautions against a surprise ; very many prisoners and guns fell into the hands of the troops.

At 6 p. m. the Champ de Mars was taken by General de Cissey, General Clinchant captured the Chateau de la Muette.

The Commune on this day informed Paris, that through treason the troops had entered but they would be at once driven out again.

General de Cissey commanded on the left bank of the Seine, next to him came Douay, then Clinchant, and on his left Ladmirault, General Vinoy being in support of De Cissey on the left bank.

advanced their trenches rapidly, but the ramparts were very little damaged and backed up by an organized defense in rear could long have withstood the Versailles.

Fort Montrouge covered the left of the proposed interior defense. But Rossel even had not convinced the Commune that acts and not words were required: and so invaluable time slipped by. Meanwhile the Artillery duel continued and enormous shells went hissing into Paris day and night.

On the 16th April the Vendome column was pulled down, it was 132 feet high, and had been erected by Napoleon 1st to commemorate the glorious campaign of 1805, which had ended in Austerlitz. The Commune declared that they would have no monuments erected, but in memory of glorious conquests in the field of science, labour and liberty, such were the words of the men who were so soon to burn libraries and scientific collections.

The map is drawn with the intention of showing the great strength of Paris in the hands of any but thoroughly disorganised troops. The emperor had almost rebuilt the city, the object was political, because precedents shewed that Paris always led French politics, a revolution in Paris meant a revolution for the French nation; immensely broad avenues or boulevards now intersected Paris in such a way that they could be swept by the fire from certain strategical points where great barracks were often established and Artillery and mitrailleuses being at hand, even a general rising could be divided into fragments and beaten in detail, and to make it the more difficult to construct barricades asphalt was fast replacing the stone pavements. The builders of Paris had however never calculated on the possibility of the revolutionists possessing Artillery. The map shows the arrangement of the principal streets only, the unimportant being omitted.

On the 17th May the whole of Paris was alarmed by a tremendous explosion which turned out to be the Cartridge Manufactory Avenue I-app. The Commune cried out treason, but it was the result of an accident.

On the 21st May the besiegers had sapped to within a few yards of the ditch of the enceinte at the Point-du-Jour, when they received notice that the position was not guarded; finding that the battalion on duty at the Point-du-Jour had actually deserted their posts to seek shelter in the vicinity, General Douay marched his men into Paris, and now commenced a seven days' battle in the streets of the city.

On crossing the Point-du-Jour a party working rapidly to the left opened some of the gates of the western ramparts: while another party crossing by the Auteuil Viaduct, whose defenses they had turned, opened the gates of Issy and Vaugirard. On the night of the 21st General de Cissey's right flank faced the Railway station of Montpar-

nasse. Meanwhile Vinoy had taken the bridge of Grenelle and advanced along the ramparts as far as the Porte-de-Passy.

It is possible that the cry of treason raised by the Commune was not unfounded, because considering the stubborn resistance hitherto made by the western defenses, notably the Porte-Maillot and Neuilly, it seems suspicious that so little resistance was now made, it was even less than at the Point-du-Jour.

At 4 p. m. Douay entered Paris, and was followed in the next few hours by the other corps. MacMahon moving his Head Quarters from Mt. Valérien to Boulogne ordered the Generals to push for the strategic positions neglecting unimportant defenses.

The Trocadero was the first position that it was important to capture, because then it would be possible to operate against the Place de-l'Etoile.

On the right the Place-d'Enfer and the Carrefour-de-l'Observatoire were the objective points.

On the 21st May no important position was taken, but the two bridges connecting the right and left attacks were tolerably secure.

The relative heights of certain important positions were as follows :—

Trocadero	213 feet	} Mont Valérien 520 feet.
Place-de-l'Etoile	190 "	
Place Wagram	141 "	
Montmartre	420 "	
Buttes de Chaumont	331 "	
Cemetery of Père Lachaise	315 "	

These were the commanding positions of Paris.

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With the Ecole Militaire the Versaillais captured several hundred was, vast stores of munitions of war and provisions.

The Place Bréteuil was next occupied.

The Railway station of Mont Parnasse was now seized and forti- fed, a most important position being thus secured, the insurgents how- ever having formidable barricades in the Rue de Rennes opened a heavy fire on the railway station, they moreover took the offensive in force and there was fierce fighting for many hours, but fortunately the post had been fortified.

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During this time Douay's Corps pivoting on its right, that is to
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 and occupied a position at the intersection of the Rue Lafayette, and the
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Ladmirault was to follow the Railway parallel to the ramparts as far as the Porte d'Asnières, Clinchant was to make himself master of the St. Lazare Railway station, the Pépinière barracks and the College Chaptal.

Douay was to occupy the Palais de l'Industrie and the Palais de l'Elysée.

De Cisse was to march on the Ecole Militaire and the Invalides, turning them from the east. The Railway station of Montparnasse to be seized if possible.

Vinoy was to support De Cisse who had been obliged to leave a large force in charge of the forts and batteries on the south.

Vinoy was to occupy the Emperor's Stables and the Manufactory of Tobacco before night, and was to detach a division to the Trocadero where it would remain in reserve.

On this day, the 22nd, Macmahon moved his Head Quarters to the Trocadero.

After a determined resistance, Clinchant captured the Place d'Eylau and opened the Porte Dauphine.

The Place de l'Etoile was surprised while the Communists were constructing a battery on the top of the Arc de Triomphe, they withdrew their guns however down the Champs Elysées and established a formidable battery on the terrace of Tuileries.

The Palais de l'Industrie and the Elysée were taken by Douay.

The Pépinière barracks and the Church of St. Augustin were captured after a severe struggle, Clinchant completed his day's work by carrying the College Chaptal, the St. Lazare Station, the Place Wagram and the Place de Courcelles, thus opening the Porte des Ternes, the next gate and the Porte d'Asnières.

General Montaudon had remained outside to guard Neuilly and Asnières, but seeing how matters stood he seized the village of Levallois, capturing numerous batteries said to contain 105 guns; the Porte Maillot was also opened.

With the Ecole Militaire the Versaillais captured several hundred guns, vast stores of munitions of war and provisions.

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The Versaillais then working along the railway carried a strong barricade at the intersection of the lines of railway and opened the Porte de Vanves.

The ground gained up to the night of the 22nd can be seen by the map.

After the troops entered, the gas was not lighted nor was it possible to use it for many days, but the streets of Paris were soon to be lighted by the vast conflagrations. Previously to the entry of the Versaillais, the city had been brilliantly lighted, thus giving to the enemy a great advantage in laying their guns.

23rd May, Vinoy, who was protecting the flank of the attack on the Palais de l'Industrie, seized the Ministry of Foreign Affairs and the Corps Législatif.

The heights of Montmartre had been well prepared for defense, but all the guns and barricade faced the south; the position was regarded as a reduit for the defenders of Paris; but this day to the surprise of all, this the most important position of all was turned and captured, it was managed in this way. General Ladmirault working along the ramparts silently crept up the northern or precipitous slopes, he also sent a party up the eastern; from these directions an attack was not expected; meanwhile Clinchant attacked from the west; these preliminaries began at 4 a. m. After a severely punished attack the Cemetery of Montmartre was captured, the Place de Clichy and the Mairie. At 1 p. m. the tricolour waved from the well known Moulin de la Galette, the whole of Montmartre was now occupied, the insurgents losing their principal stronghold, very many guns and stores of ammunition.

The Division Montaudon which had not co-operated in the capture of the Buttes de Montmartre now fought its way in the direction of the terminus of the Chemin de fer du Nord and Clinchant descending the slopes of Montmartre captured Notre Dame de Lorette.

During this time Douay's Corps pivoting on its right, that is to say, on Palais de l'Industrie advanced its left on Notre Dame de Lorette, and occupied a position at the intersection of the Rue Lafayette, and the Rue du Faubourg-Montmartre, then fortifying these points, troops were sent down the Rue Drouot on to the Boulevards taking the Marie of the 9th Arrondissement and turning the defenses of the Opera. The Mairie was the head quarters of an arrondissement.

We have seen how the barricades of the Opera were turned, it was by turning movements that most of the really formidable barricades were taken. When it was not possible to turn a strong barricade, it became necessary to work up to it through the houses, small charges of some detonating substance such as gun cotton making sufficiently large

holes in the partition walls without shaking them down as powder might have done.

Douay now dressed up his right centre which worked its way through houses and gardens, he with very great difficulty made himself master of the Rue Royale and the Place de la Madeleine.

Street sapping was had recourse to when it was necessary to effect a communication across a street, part of which was occupied by the enemy.

The Place de la Concorde was defended by a most formidable barricade in the Rue de Rivoli, it had been long constructed and no pains had been spared to perfect it; the revetment was of casks consolidated together with cement, this barricade was made in two parts overlapping each other in such a way as not to interfere with the traffic, this was the plan of all the barricades except those that were hastily thrown up in the narrow streets on the advance of the troops; these were often very badly constructed, being principally the work of the gamins: every one passing a barricade was obliged to lay at least one stone.

A glance at the map will show that the barricade of the Place de la Concorde and the defenses of the Place Vendome were now in danger of being turned.

On the left bank the troops wheeled forward on their centre, after very hard fighting they captured the barricade of the Boulevard du Maine and the Rue de Vanves. The same determined resistance was encountered at the cemetery of Mont-Parnasse.

Every effort was now made to take the strong defenses of the Place de St. Pierre, its capture turned all the barricades in the Rue de Chatillon.

A very important position was next secured by the capture of the Place d'Enfer.

It must be borne in mind that these operations on the right required the greatest caution or the whole force in Paris might be endangered; every care had been taken to protect the extreme right because it must be remembered that the insurgents still held forts Montrouge, Bicetre and Ivry.

The Versaillais on this day also seized the Caserne de Babylone and L'Abbaye-aux-bois, and attacked the Place de la Croix-Rouge where the enemy defended themselves with considerable forces, and did not retire till night had set in.

The Ministry of War was also taken and the barricades as far as the Rue du Bac, which the insurgents continued to hold, but the heads

of the columns crossed the street and occupied St. Thomas d' Aquin. The fighting had been very severe all day. In the evening the troops turned the two barricades in the Rue de Rennes, which held in check the fortified position at the Mont Parnasse Railway Station. A reference to the map will show that the lines of the assailants formed a re-entering angle with its apex at the Place de la Concorde : it had therefore come about partly by chance, partly by good generalship, that the Versailles on the 23rd May had out-generaled the insurgents.

In the centre, the Communists must now face right and left of their lines of retreat, and offer a weak salient to attack, still further weakened by the fact that the forcing of any point in rear would turn its defenses and take the defenders of the opposite side in rear.

The importance of Montmartre is now very apparent. So far there had been three days fighting in the streets of Paris, and if a city is made the theatre of war a certain amount of damage must necessarily be done.

On the 21st May the members of the Commune had dispersed to their several arrondissements in order to direct the defenses, therefore the deeds that followed cannot be put down to the account of the Commune as a body but rather to individual members.

In consequence of so many important positions being turned and occupied before the defenders could withdraw in good order to the next barricade, the Communists determined to change their tactics. They therefore requisitioned all petroleum and inflammable substances, and instructed that when it became evident that a barricade was untenable, the houses on each side were to be set on fire, the result being that the assailants must cross the barricade in the centre of the street, where they would be under the most effective fire ; by this means the advance was often much delayed.

Sometimes a direct attack on a barricade was made in this way. Supposing the assailants to have no barricade to cover their guns, they would then load in a side street, run the gun round the corner, fire it and immediately draw it back again to be reloaded. There were of course riflemen in the adjacent houses keeping down the enemy's fire. When the Artillery had taken effect, the assailants would work up the streets in Indian file, keeping close to the houses and sheltering themselves in angles and doorways, and every now and then mounting to the windows ; they thus slowly made ground till the barricade could be crossed with a rush and the houses on the far side occupied ; but the insurgents often adopted the same tactics and then the fighting became most stubborn.

No one could blame the Communists, fighting as they were for their lives and so-called principles, against a Government they detested, had their house burning been only for tactical considerations, but on the

24th May began incendiarism or the malicious burning of public buildings, which were mostly not the property of Paris alone, but of France. On the 24th May long before daylight an immense conflagration was devouring the Palais de la Legion-d'Honneur, La Cour des Comptes and the Conseil d'Etat. The Tuileries had been burning all night, and the fire was rapidly advancing towards the Louvre, which contained galleries of the most valuable pictures in Europe.

The state of affairs was now indeed alarming ; no one could possibly foresee what was about to happen ; one heard continual explosions and new fires were breaking out in all directions. The Ministry of Finance soon began to burn and was followed by the Palais Royal. We cannot stop to take notice of the numerous private houses, but must pass on to the burning of the Palais de Justice, Le Théâtre-Lyrique and the Hotel de Ville. The whole centre of Paris was in flames and valuable records were being consumed ; and every one fancied the priceless canvas of the Louvre was feeding the flames, but the Louvre almost by a miracle escaped.

A great effort was now made by the centre to push on and save the public monuments.

De Cissey had divided his corps into two divisions, one to continue the movement to the east and south and the other to direct itself on the centre of Paris ; this latter division captured the Ecole des Beaux Arts L'Institut de la Monnaie. This division then attacked the Luxembourg from the north while the other advanced from the south and west. In order to secure the Luxembourg it was at once necessary to capture the Panthéon whose guns were firing from the barricade of the Rue Soufflot, this position was occupied, also the Place St. Sulpice and the Ecole de Médecine.

The troops were now up to the Boulevard de Sebastopol, but could not cross ; the insurgents must have known the importance of preventing the troops from crossing this long straight avenue and the parallel one in rear : but about 4 o'clock, Artillery being brought to bear on the batteries about the bridge St. Michel, the boulevard was crossed and the Place Maubert and the Lycée Louis-le-grand occupied.

De Cissey now carried the Ecole Polytechnic. The Panthéon had been saved from destruction through the courage of one individual who cut the slow match.

On the right bank, Douay had early in the morning captured the Place Vendome, which made but a feeble resistance, the position being turned, this movement also rendered useless the formidable barricade of the Place de la Concorde ; on retreating, the Ministry of Finance was fired. The Palais Royal was the next capture. The Bank and the Bourse were the next to follow, the former had been fortified and defended throughout by the officials ; it was said that they had flooded the

cellars from the Seine and sent every one out of Paris who knew the secret of the sluices. The Communists however never entered the Bank. Douay now took the direction of the Post Office and the Church St. Eustache, and by 9 o'clock in the evening Vinoy was on the Place de l'Hotel de Ville, and later at the barracks Napoléon; these buildings were in flames.

General Clinchant was now ordered to take the direction of the Chateau d' Eau, a position of the greatest importance and well prepared for defense.

The next captures were the Conservatoire de Musique, the Church St. Eugène, and good service was done by the capture of the Porte St. Denis.

Meanwhile another division captured the Church St. Vincent de Paul, the barracks de la Nouvelle France, and the barricades at the meeting of the Rue Chabrol with the Boulevard Magenta.

During this time Ladmirault captured the terminus of the Chemin de Fer du Nord after severe fighting.

Another division, after repulsing an offensive movement, captured the barricades of the Boulevard St. Rochechouart, other strong barricades in the Rue Lafayette and the terminus of the Strasburg railway.

On this day batteries were commenced on the Buttes de Montmartre, in order to bring fire to bear on the insurgent batteries on the Buttes de Chaumont. The angle of depression from the Montmartre batteries to the Communist redoubt on the Buttes de Chaumont was 1° 40' and the range could not have been less than 3300 yards. MacMahon had moved his head quarters to the Ministry of Foreign Affairs.

The line of attack was now nearly a straight line; the Centre had advanced but the flanks had not, the left being opposed by the Buttes de Chaumont and the right by Forts Montrouge, Bicetre and Ivry.

This 24th May, so destructive to the public monuments of Paris, also marks the date from which the butcheries commenced in earnest. No excuse can be made for the wanton destruction of Paris, and very little can be made for the troops who from this hour seemed to gloat in bloodshed; plenty of blood had been spilt already in the city, but it only represented a rivulet in comparison with the torrents that were soon to flow.

Wounded Communists were shown no mercy, were made when possible to march, and were often bayoneted at the barricades; and it was said that prisoners were shot under the applause of bystanders on no other authority than that of private soldiers, and on no proof whatever that they were deserving of death or any other punishment.

Now began the second Reign of Terror ; everyone who was supposed to have fraternised with or aided the Communists in any way, were in imminent danger, even those belonging to the ambulances and certain newspaper correspondents began to feel uneasy.

The streets in the vicinity of the fighting were deserted, shops and cafés were everywhere closed, and the National Guards of order turning out with tricolour brassards, patrolled the streets in rear of the fighting, stopping and bullying all pedestrians they chose. Passeports had to be produced continually, and were most carefully examined and woe to the unlucky foreigner whose last visé was more than a few days old.

On one side of Paris, tricolour flags waved in every street as on fête days, but on the other side the red flag still held its own.

We now come to the 25th May. The order for this day was if possible to occupy three important points, namely the Butte aux Cailles, the Place de la Bastille and the Place and Barracks of the Chateau d'Eau ; on this day Fort Montrouge was taken and Bicetre was shamefully given up, the insurgents no doubt fancied they would be safer in Paris, and feared lest their retreat should be cut off. A reconnoitring party found no difficulty in capturing the redoubts of Hautes Bruyères and Villejuif.

In the afternoon a tremendous explosion was heard in the direction of Fort Ivry, and a great column of smoke rolled upwards ; this turned out to be the accidental explosion of a magazine in the curtain of the south front of Fort Ivry, a breach being formed in the scarp. Great confusion prevailed in the fort, which was easily occupied by the Versailles. To return to the interior of the city.

On the left bank the insurrection was concentrated on the Place d'Italie and the Butte aux Cailles, and to all appearance a stubborn defense was to be anticipated.

De Cisse gave orders for these positions to be taken in reverse by turning movements right and left, and to support this attack a battery had been erected during the night in one of the bastions and at the Observatory, and on the Place d'Enfer ; after battering the positions for some hours, about mid-day the columns advanced.

On the right a party left the Montsouris Park, and pushing on between the Chemin de Fer du Ceinture and the fortifications, captured bastion after bastion and turning to the north occupied the goods station.

Another party crossing the Bièvre advanced to the assault of the Butte aux Cailles across gardens and enclosures, the Avenue d'Italie and the route de Choisy were reached.

On the left of this party, another advancing by the Boulevard Arago and Port Royal, seized the Gobelins which the Communists set fire to on retreating.

The barricade on the Boulevard St. Marcel was taken, and the insurgents attacked in front and flank fled in disorder, leaving 20 guns, some mitrailleuses and several hundred prisoners.

The troops continuing their march by the Boulevards de l'Hopital and De la Gare cut off several hundred Communists who surrendered.

There had been very hard fighting on the right ; the insurgents took advantage of the natural entrenchments formed by the Bièvre and under cover of the batteries of the Butte aux Cailles made an offensive movement, with the object of retaking the democratic arrondissement of Montrouge, and turning the right of the attack ; De Cisse was for many hours engaged in holding his own, and had actually to send for reinforcements : the capture of the Butte aux Cailles was of the greatest importance.

Along the left bank a division advancing to the south of the Halle aux Vins crossed the Jardin des Plantes, and faced the terminus of the Orleans Railway.

The Reserve under Vinoy marched in three columns, the right with conspicuous élan assaulted and took the terminus of the Orleans Railway ; the centre following the right bank reached the Grenier d'Abondance, which had been fired by the insurgents ; it was one of the most striking of the fires in Paris ; a dense column of smoke rose to a great height and then floating due west was lost in the horizon. Great difficulty was experienced in crossing the Canal de l'Arsenal ; the Versailles gun boats came into action for the first time and under cover of their fire a rush was made across by a body of troops, who rapidly ascending the quay occupied the bridge of Bercy, and at night the terminus of the Lyons Railway and the prison of Mazas, from which the hostages had lately been removed to La Roquette.

The Communists were well aware of the importance of the Place de la Bastille, and were prepared to defend it to the last, but as usual the turning movements of the attack were successful. The left of Vinoy's corps intending to attack from the north, first seized the Barricade rue de Saint Antoine, occupying the Place Royale, but night coming on the troops halted.

The gun boats on this 25th May did good service, advancing to the heads of the attack, and after the fall of the bridge of Austerlitz were greatly instrumental in the capture of the bridge of Bercy ; meanwhile Douay, supporting Clinchant in his attack on the Chateau d'Eau, captured the National Printing Establishment, and pushed on almost to the Boulevard du Temple, but the Chateau d'Eau like the Bastille was not to be taken without hard fighting. Douay bivouaced but kept up a constant fire on the enemy all night ; the nights like the days were one constant roar of cannon, crackling of musketry and growling of mitrailleuses, with every now and then an explosion that

seemed to shake the city. Night and day the powerful batteries on the Buttes de Chaumont, Menilmontant and Père Lachaise bombarded the city. It was well for beautiful Paris that the troops had crossed the enceinte by a surprise, and before a well organized interior defense had been prepared, or it is possible that a resistance would have been made which would not have been overcome till the city had been destroyed, so determined was the Versailles Government not to treat with the insurrection.

The Versaillais could never have made the rapid advance they had done if the barricades had been properly defended. We made many inquiries with reference to different barricades, and it was always the same story—"The defenders ran away on the approach of the troops, leaving a few however, who though unsupported had defended the barricade for several hours and then retired." The mitrailleuses seem to have been most effective in the defense of streets. At one particular barricade all testimony concurred in proving, that after the defenders had run away it was defended for five hours by one Artilleryman with a Gatlin mitrailleuse ; he had afterwards surrendered on the understanding that his life was to be spared, however he was lying dead, having been shot as they said "pour s'en débarrasser;" those who repeated this story could have had no object in misstating facts.

Ancient Paris, that is to say, the Arrondissement du Temple was now in the hands of the troops ; this district was famous in the older revolutions.

Batteries were constructed in the Rue du Chateau d'Eau and in the Boulevard de Magenta, which fired on the insurgent batteries. The troops during the night succeeded in establishing themselves in the Rue de Magnan and captured the Hotel de la Douane.

The theatre and a large building in the Boulevard St. Martin had been burning all day.

On this day Ladmirault, who was to cooperate in the attack on the Buttes de Chaumont, prepared the way by seizing the principal points for crossing the canal, he closed on the Rotonde de la Villette and advanced his left along the ramparts.

The general movement on the 25th may be described as a wheel forwards on the left centre.

It is said that on the 26th, before it was light, an engineer party from the Rue de la Douane made a rush and broke open the gate of the barracks of the Chateau d'Eau, a storming party followed and the barracks were occupied, and almost immediately the barracks were secured.

It would seem difficult to exaggerate the horrors of this war, but it was an exaggeration to say that the streets ever ran blood ; however, on this day a fine rain descending, the gutters did actually carry away streams of blood and water.

The Communists were still strongly posted, and if not utterly disorganized might be expected to defend themselves for some days yet.

Montmartre had been their great loss, and it was now turned against them.

In the early morning operations were continued against the Place de la Bastille: the idea was to turn it from the east ; with this object at 2 A. M., a division advancing by the Quartier de Bercy as far as the Station Bel Air, captured the ramparts, turned about and profiting by the railway embankment marched by the great road, suffering severely on the right flank, but succeeded however in securing the terminus of the Vincennes Railway. Another party at the same time fought its way up towards the Rue du Faubourg St. Antoine.

All the defenses of the Place de la Bastille were now turned ; the fighting had been severe, and the Communists had suffered heavy losses. A certain number retired on the Place du Trône. The Bronze Column in the place de la Bastille was riddled by Versailles shells at heights that proved how badly their gunners had laid their pieces. Vinoy now made for the Place du Trône, and after severe fighting it was abandoned about 8 P. M., but the Versailles could not occupy it as it was exposed to the fire of batteries placed near the Mairie Place Voltaire, the troops therefore bivouaced in the neighbouring streets. Meanwhile Douay fought his way up to the Boulevard Richard Lenoir. Clinchant also moved up to the Canal. Ladmirault fought his way to the Rotonde de Villette, but not in time to save the docks, which made one of the most conspicuous of the great conflagrations: judging by the number of bullet marks the fighting at this position must have been severe. The result of the fighting of the 26th was a slight advance in the centre and wheels of the flanks, so that now the line of attack was semicircular and in close contact with the enemy all along the line.

The Communists were in great force, and backed by powerful batteries on the Butte de Chaumont, Menilmontant and Père Lachaise, but they were thoroughly demoralized and weary from constant fighting and retreating.

The 27th May may be said to be the beginning of the end.

The Communists were now in their last strongholds, but had Montmartre been in their possession, they might have prolonged the street fighting and secured terms. As it was, however, they were in great force in a strong position, and were moreover at bay and so would probably fight desperately. It was not easy to advance, so the old plan of executing a turning movement was resorted to. With this object Douay and Clinchant remained on the defensive on the Boulevard Richard Lenoir and the canal, whilst Ladmirault and Vinoy tried to attack from the east. The key to the position was to be found between the gates of Romainville and Menilmontant where there is a command of several feet over the Buttes de Chaumont and Père La-

chaise ; this point secured the troops might advance westward, drive the insurgents from the heights and bring them between two fires.

Ladmirault therefore fought his way along the military road on the north and then turned south, while Vinoy advanced from the south : they were to join bands at the position named. Ladmirault towards evening carried the Buttes de Chaumont by assault, a great number of guns and stores falling into his hands. Meanwhile Vinoy after hard fighting worked up the Rue de Puebla and reached the Cemetery of Père Lachaise ; here a stubborn resistance was made, but the organized attack of a few hundred, triumphed over the disorganized defense of many thousands.

The Place Voltaire was well fortified and fired case on the Place du Trône : a powerful battery had therefore to be made in order to counter-batter the Communist work.

The centre, under Douay and Clinchant, were ordered to consolidate their defense, because the plan was to drive the insurgents on their lines ; they therefore established powerful batteries to sweep the principal approaches and to block them up against any attempt of the Communists to break through.

The positions occupied on the 27th are shown on the map ; on the 28th the troops continued to still further envelop the insurgents.

Vinoy pushing forward dislodged the defenders of a formidable barricade in the Rue Haxo, taking many prisoners ; it was in this street that the Communists had shot 44 hostages, principally priests and gendarmes. There must have been a regular " Sauve qui peut " in the Rue de Puebla, as it was completely strewed with knapsacks, rifles, képis and accoutrements.

A party advancing westward, surrounded the prison of La Roquette, and released nearly 200 hostages, but unfortunately a number had been previously shot, amongst them the Archbishop.

The troops working along the ramparts formed a junction. The Communists were now surrounded and attacked on all sides, but fighting continued in Belleville till about 3 p. m. when all resistance ceased, several thousand prisoners and many guns falling into the hands of the troops.

The war was over, nothing remaining to the Communists but the Fort of Vincennes, which surrendered on summons at 10 a. m on the 29th May. The insurrection was crushed, and it is said that upwards of 25,000 prisoners were taken.

Paris was being disarmed and those who were afraid to show themselves either dropt their rifles in the streets or sent them to the Mairies by women or children : the streets were covered with rifles, revolvers, swords and pistols, and at the Mairies they were stacked many feet high.

Domiciliary visits were made so that no one dared have a firearm in his possession. The Versailles are said to have lost about 7,500 killed and wounded ; the loss of the Communists was far more severe.

The valour of the troops was sullied by their merciless butcheries. It is true that Paris was on fire, and that hostages had been shot, but the Versailles had also shot and ill-treated Communist prisoners. No one will excuse those who made the Dominican Fathers run one by one, and shot them for sport ; no one will make excuse for the savage Ferré, who ordered the wanton execution of the Archbishop, a man who throughout the German siege had been constantly under fire in the service of the ambulances ; but in justice it must be remembered that these crimes cannot be brought home to every Communist, the deeds were perpetrated by a minority, by men the like of whom exist in every population, by such men as we have in our own cities, ferocious brutes like the Bill Sykes of Dickens.

Ought we not to make some allowance for men, who had gone through the privations of the German siege without a murmur and had conducted themselves in such a way that violent crime was hardly known : these men were civilians, yet they had cheerfully guarded the ramparts day and night throughout the severe winter.

Nothing can be said for the majority of the members of the Commune, but the rank and file believed that they were fighting for the privileges of Paris and the Republic, as it was believed that M. Thiers was intriguing for a monarchy which they detested.

The prison or rather prisons of La Roquette are divided by the road to Père Lachaise ; La Roquette on the east has the inscription "Pour les condamnés," it was here the Archbishop was murdered on the 24th May.

On the opposite prison is written "pour les enfants detenus." The circular interior court of this prison is divided into 5 open compartments ; these courts were packed with thousands of prisoners. It was possible to walk round a circular and raised path in the centre, and so visit each ward, the pathway was partitioned off by iron bars. The mixture in the court was strange, there were men, women and children (the women were afterwards removed) : most of the prisoners bore signs of the hard fighting they had seen. Amongst them were well dressed officers, but most of the latter had torn off the lace they had but lately been so proud to wear. In the outer court, firing was going on and it was stated that the then Governor of the prison passed the prisoners before him, and all marked with powder or whose right shoulder was bruised from the kicking of the rifle, were ordered out into the outer court and shot : the Governor warming to his work found it going on too slowly, and therefore by a simple glance decided the fate of the prisoners. The state of the outer court was shocking to behold. There lay a great heap of mutilated bodies covered with swarms of flies, while brains and blood strewed the place. People had become

perfectly callous to physical suffering, but the mental torture of those women in deep mourning, who crowded round the gates outside, would have moved a heart of stone : there they were inquiring after husbands, sons and brothers, and every now and then rudely pushed on one side by the sentries to make place for the carts that were removing loads of dead huddled in anyhow ; the great pressure causing the blood to trickle through the bottoms of the carts, left a red track along the road. Those despairing women might fancy those they sought to be in the carts, in the prison or about to be shot in the outer court. Many French officers loathed this cruel bloodshed, and the painful duty of having to superintend such butcheries ; all bore testimony to the fact that most of the rank and file of the Communists stood up and died like men.

No defence can be made for the conduct of Generals in charge of prisoners, who halting their unarmed columns of hunted down and wearied out enemies, fell out and shot fellow countrymen in order it is supposed to inspire terror ; especially when we remember that the whole male population was taken from certain districts, the innocent with the guilty ; all prisoners were marched to Versailles in the hot sun, along miles of dusty roads ; there were men of all ages, women and boys, bare-headed they marched, holding each other's arms.

It was possibly in order to prevent shirking that those who fell out exhausted from thirst, fatigue or want of air in the dense columns, were it is said often shot : which would seem like bayonetting a body in order to make sure that it was dead, or to prevent the remote possibility of a desperately wounded one attacking a man armed to the teeth.

The last of the insurgents captured in Belleville marched out of Paris in great columns ; amongst them could be seen many women and very old men : strange indeed was their appearance, they mostly bore signs of intense fatigue and anxiety ; their heads were bare and exposed to a fierce sun ; they appeared in the position of a man who is struck when he is down ; they were parched with thirst but boldly they marched in perfect silence arm-in-arm, fellow sufferers in the same cause ; their haggard faces too plainly showed that to many it was known that they would see Paris no more. Great as had been their crime, the sight of these men, insulted as they were by the bystanders, was touching in the extreme. These prisoners were kept for months in the camp of Satory, many being quite innocent.

Considering how often the French change their form of government political crimes should be dealt leniently with. Who were the men of the 4th September but leaders of a successful insurrection against a Government that had been 20 years in office, the Communists on the contrary belonged to an unsuccessful insurrection and never was one so trodden down. The wisdom is questionable. Consider all the families that were left completely unprovided for ; the Government also seemed

determined that sooner than one guilty man should escape, it was better to punish many innocent ones.

It can hardly be necessary to inform an English audience that the part played by petroleum was greatly exaggerated by the French, whom in general it was impossible to convince that shells simply filled with petroleum must be far less effective than where powder is used.

I must apologize for the numerous shortcomings of my lecture, one works under great disadvantages so far from all books of reference and good maps ; and having no Military History or authentic account of the Commune war, I may have made mistakes in drawing out the portions of Paris occupied on the different days.

The map referred to at page 222 was on too large a scale to be reproduced in the Journal, and no other maps are given, as they are available in so many recent Military Works.—*Editor.*

II.

STUDIES IN THE TACTICS OF INFANTRY.

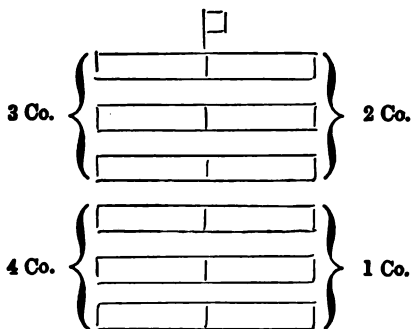
WITH AN ACCOUNT, ILLUSTRATED BY SKETCHES, OF THE COMBAT OF
A GERMAN BATTALION AS PRACTISED IN GERMANY IN 1874.

PART I.

Being dissatisfied with the rendering given to the application of the Von Scherff system of attack in India, and having the opportunity last summer, I gladly found myself on the new exercising ground at M—— on the morning of July the 21st, in the presence of a Battalion of Infantry made up to war strength, which was just going to be put through an attack according to the latest regulation.

General von H——, commanding the Brigade to which the Battalion belonged, then desired the Major Commanding to proceed with the Instruction.

The Battalion was drawn up in rendezvous order. See diagram. A formation to which our column of double companies on the centre very nearly corresponds.

Battalion in Rendezvous order.

The officers of the battalion were fallen out, and very minute directions were given as to the conduct of the operations.

The enemy was represented by a line of infantry, sparsely scattered along a detached wood and in the open, having woods at about 400 paces to the left rear.

This position was to be attacked over a perfectly open plain and it was distant from the Battalion about 1400 yards.

As General von H—— afterwards very obligingly furnished me with a description of the manœuvre, which is rendered perfectly lucid by the sketches given of the various stages of the operation, I furnish a translation of the same with drawings which will make the attack thoroughly plain.

TRANSLATION.

"Description of the movements, according to regulations, of the combat of a Battalion at a war strength, representing the attack of a Battalion of a Brigade, performed on the 21st July 1874, on the parade ground of M——, Germany."

PREFACE.

The war strength of a battalion is as follows :—

- 1 Commandant.
- 1 Lieutenant, A. D. C. or Adjutant.
- 4 Captains, commanding companies, mounted.
- 16 Lieutenants.
- 82 Non-Commissioned officers.
- 16 Drummers and Buglers.
- 908 Privates, 1st class.

Total 980 Rifles.

The battalion is composed of four companies of 76* files in three

* Note by translator.

76 × 3 = 228.

228 × 4 = 912.

I cannot account for the number of privates being 908. I presume there are 4 Non-Commissioned officers in the ranks.

rank, and the company of the two zug. The 3rd zug, the riflemen,

is formed for the combat out of the rank of the two other zug.

Each of these three zug represents then a body of 38 files.

Each zug is formed into two half zug, and each half zug into four sections.

In the manœuvres made on the 21st July, it was supposed that the battalion on the right and left took part in the attack.

The position of the enemy to be attacked was marked by a line of a few soldiers.

DESCRIPTION OF THE MOVEMENT.

At the commencement, the formation of the battalion was that of rendezvous.

To pass to the formation for combat, the commandant ordered "2nd and 3rd Companies first line," "1st and 4th Companies main line," "3rd Company directs," "extend to full distance."

After having pointed out the direction to the 3rd Company on the centre of the enemy marked out, he gave the word "march."

While the companies proceeded to their places, the commandant gave the caution for the following formation of extension.

The rifle zug of the companies of the 1st line broke up, so that each section or two sections formed one group.

In this formation the advance was made at the run to a distance of 600 paces from the enemy, and then they halted. At this time the skirmishers engaged in a slow and steady fire.

The various parts of the battalion tried to screen themselves by kneeling and lying down.

See the sketches 1st Stage.

Presently the commandant gave the signal with his sword to renew the advance. All special orders were communicated by the aide-de-camp.

The advance of the skirmishers was carried out thus. From one flank a half zug ran forward 50 to 80 paces, and threw themselves down and recommenced firing, one by one all the other zuge followed suit.

In this manner the whole line reformed line each time, 50 to 80 paces nearer to the enemy.

It was only when the line arrived at 400 paces from the enemy that the fire became more rapid. To obtain this effect a little before they arrived at this point, the chain of skirmishers was already reinforced by another half zug of each company of the advanced line, so that each section of these hal-zuge became placed and doubled between the sections already extended.

By this movement there were now six half zuge in the chain of skirmishers, and six halt zuge in the first line, while there were six complete zuge in the main line.

While the advance was continued, a fourth half zug of the 1st line companies was fitted in to the chain of skirmishers, and the fire became thus more powerful as they approached the enemy.

See the sketch of the 2nd Stage.

In like manner the last zug of the companies of the 1st line entered the chain of skirmishers, but not so much, if at all, extended. Bayonets were now fixed.*

The main line now approached the chain of skirmishers.

At 200 or at the most 300 paces from the enemy the skirmisher line, which now represented a force of six complete zuge, halted and commenced a fire of increased rapidity.

* Note by the Translator. Of course all this reinforcement was performed in the same manner by rushes and lying down alternately.

The 4th company was commanded to advance up to the chain of skirmishers, and while they were moving forward the first company took post at 150 paces distance from the same. At the very moment that the 4th company arrived at the skirmisher line, the commandant ordered "a general attack" and "charge bayonets."

Previous to the attack the heavy fire lasted about 5 minutes.

See sketch of the 3rd Stage.

Before commencing the attack, the salient of the enemy's position was pointed out to the right wing of the 2nd company as direction of attack, while at the same time the 4th company, being now allied with the left wing of the 3rd company, was directed towards the north-east skirt of the wood.

The signal having been given for the attack the whole battalion threw itself forward at the charge on the enemy, who, being overcome was followed by a well sustained fire in the open ground.

The 3rd company, following the enemy at his heels, advanced through the wood to the west and south west border of it, and the 4th company at the same time formed in the wood behind the 3rd company as its reserve.

The 1st company, which took part in the attack as reserve at 150 paces distance from the front line, had been commanded to act in close order against any troops of the enemy who might make a counter-stroke.

The enemy having been overpowered, retired in the direction of the Parc de F——, where he took up a new position.

In consequence the 2nd company made a change of front; the 3rd company held its position on the west and south-west border of the wood, and the 1st and 4th companies were placed as main line, well covered and near to the 2nd and 3rd companies which remained extended.

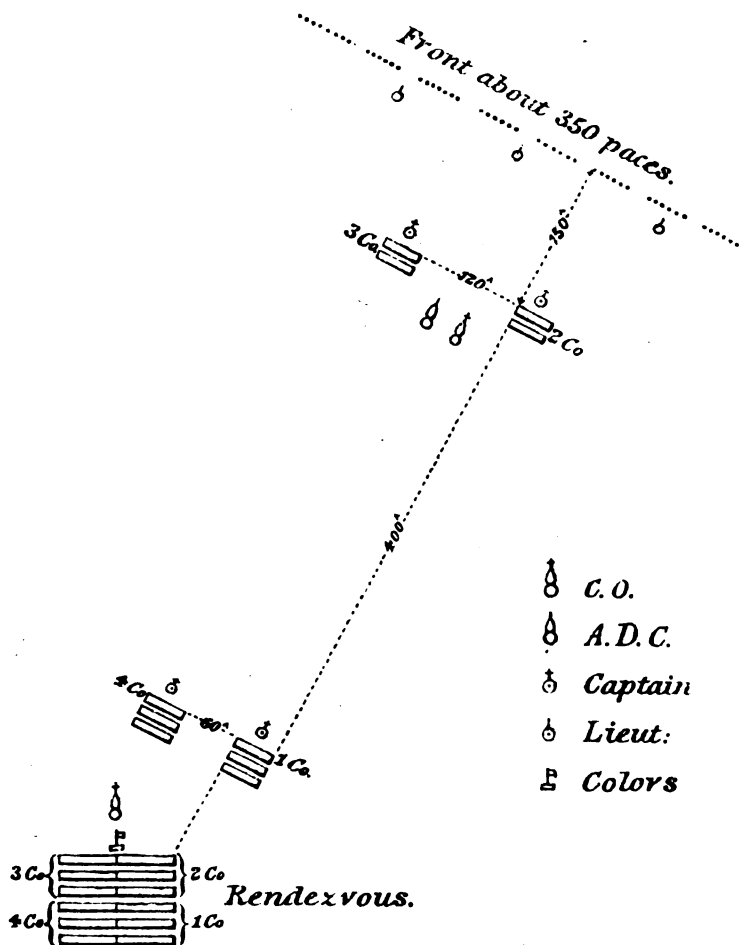
See 4th Stage.

Here the exercise ended and the signal for the assembly was given."

SKETCHES OF THE COMBAT OF A GERMAN BATTALION.

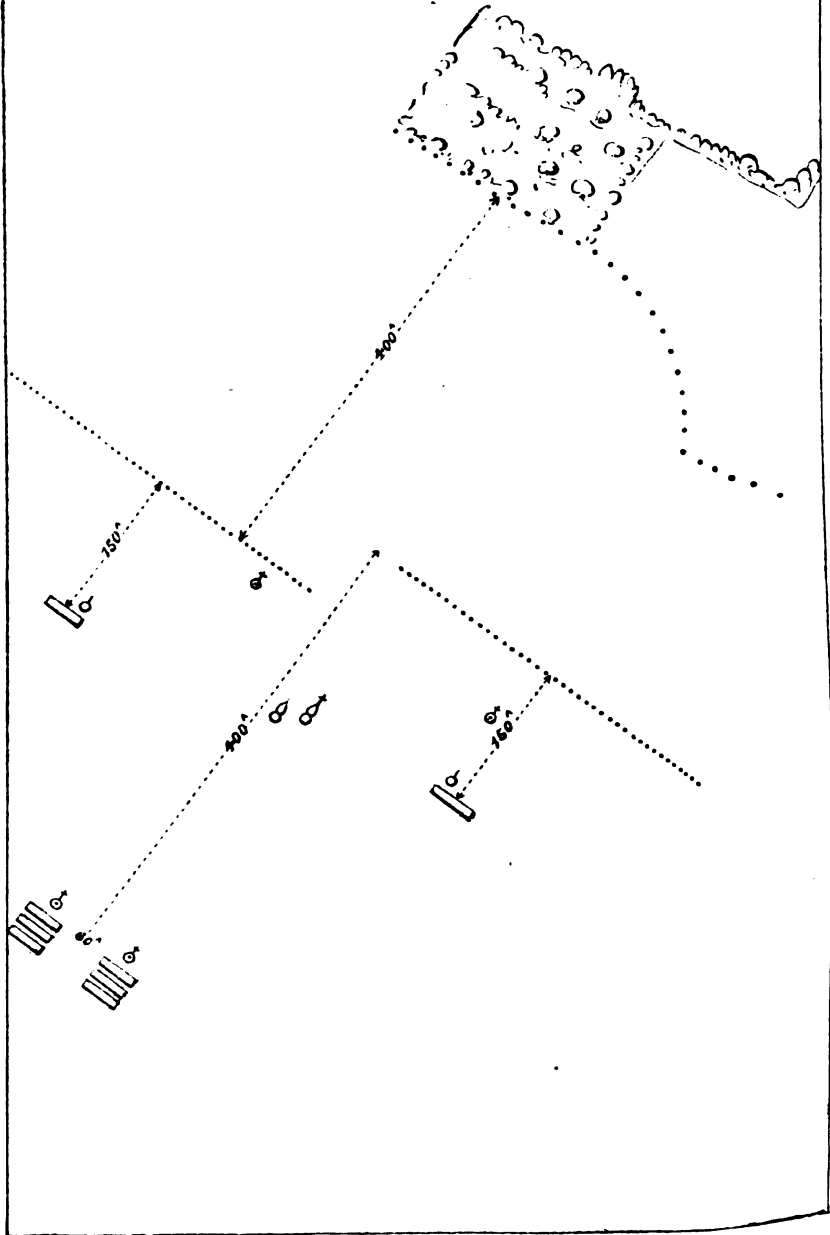
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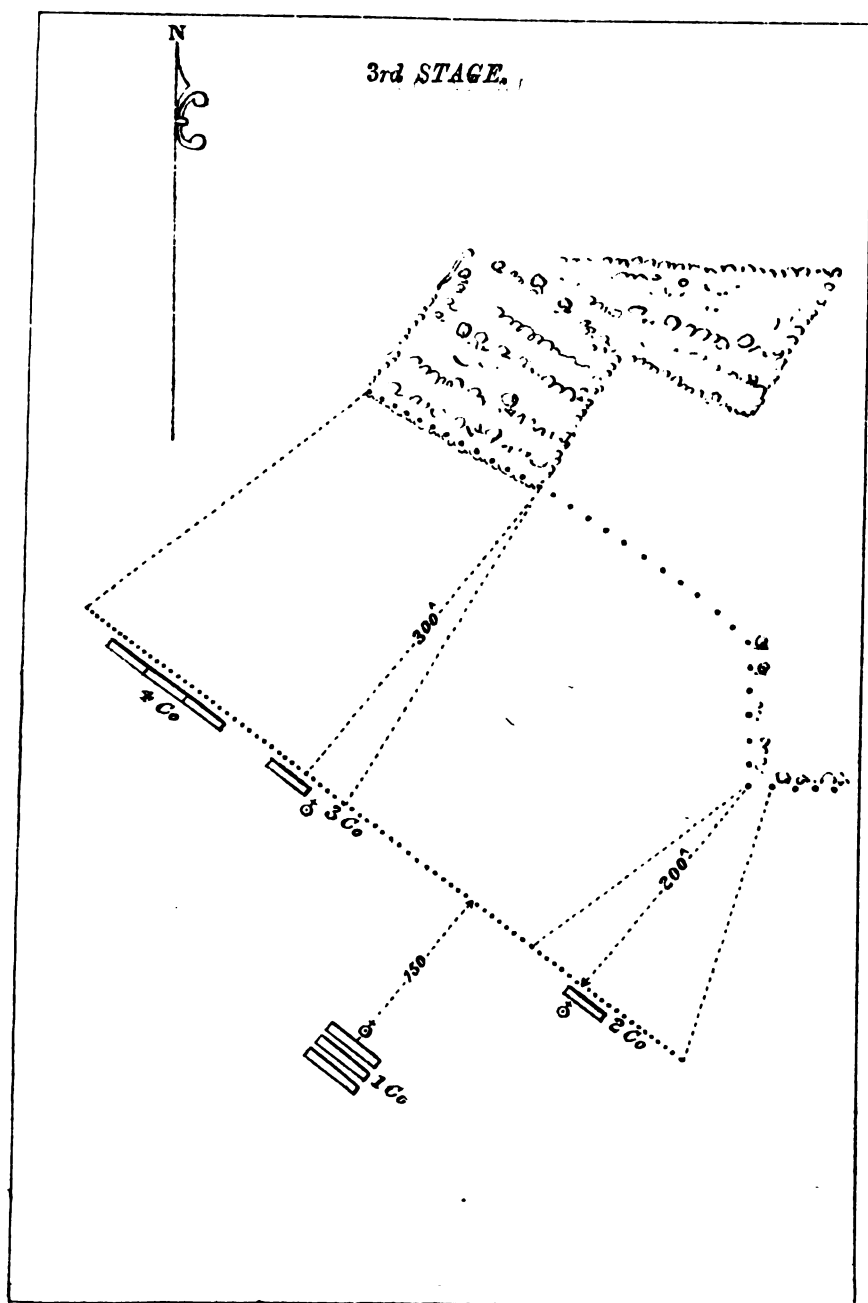
1st STAGE.



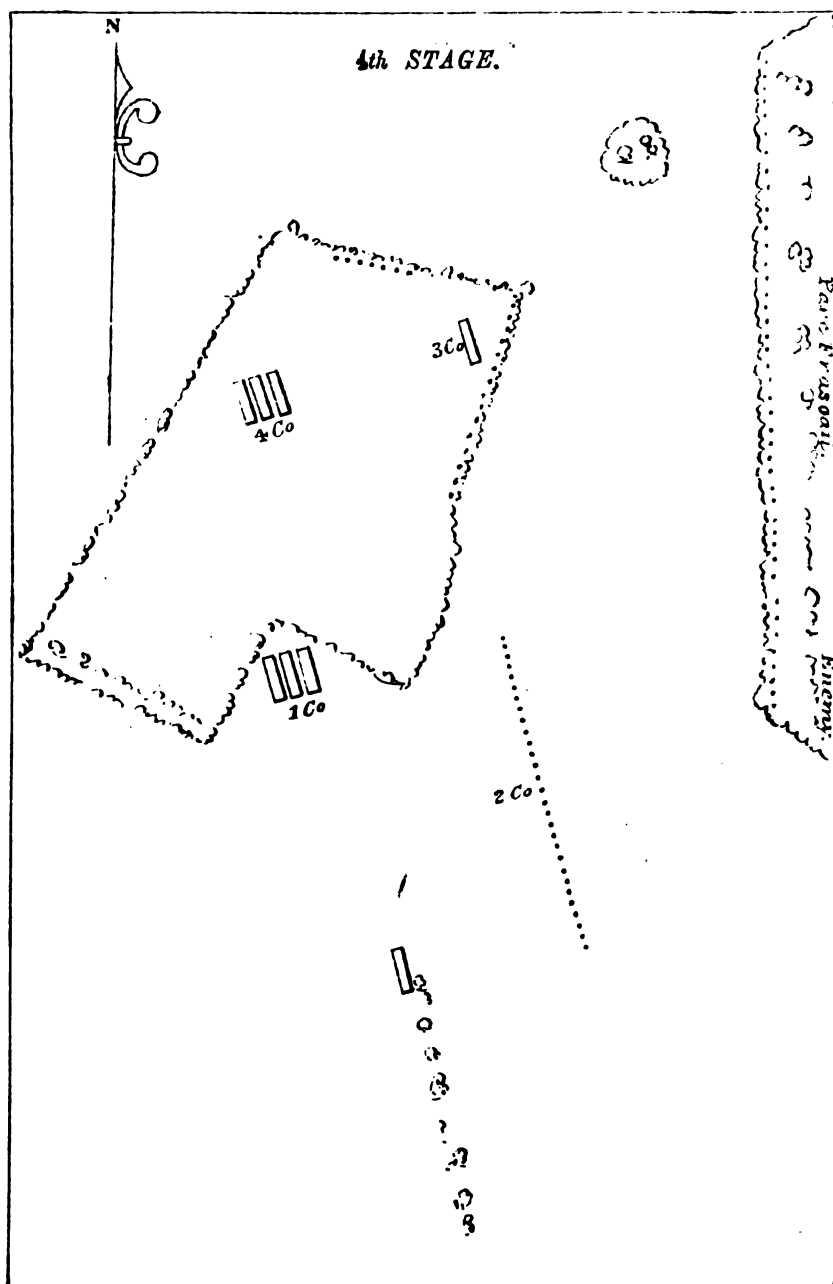
Explanation of the sign \wedge = a pace.

2nd STAGE.





Note by the Translator.—The line has become considerably extended and would now be about 450 yards.



Note by the Translator.—No. 4 Company seemed to me to make a flank attack on right of the enemy's position.

PART II.

Observations.

The operation described having been performed before me gave rise to the following reflections.

I saw here a foreign army adopting a formation which has more or less been familiar to our own, ever since the Peninsular, and which gave us the victory there, in the Crimea, and here in India. Most notably was this fighting in extended order successful, when our troops in such minority and against such odds had under Havelock to engage the mutineers.

I do not say that there was no lesson to be learnt; on the contrary I had before me the result of the experience and study of a very methodical people, who had given their minds to bring to rule and order an exceedingly difficult operation, and one in which the morale and nerves are most severely tried.

Here was an example of a military power which had been surpassingly successful in recent warfare, having corrected its errors, teaching young troops in *peace time*, because they believe in the maxim expressed by Bugeaud, "*Il faut avoir des principes; il ne faut pas se livrer au hasard de l'inspiration.*"

First Stage—Preparatory.

The first thing to be remarked was that the question considered by Von Scherff in his preparatory stage (at page 43 of Colonel Graham's translation) appears to have been decided—Two companies formed first line and not one company as Von Scherff appears to consider most advisable.

I proceed now to note what I consider to be worthy of remark in the various stages of the operation.

Above all let us remark that while unity of command of the battalion is thoroughly recognized, the battalion passed into its normal battle formation of company columns. Even second and third lines of battle under certain conditions adopt this formation, and without, I am informed, any loss of the principle of the unity of the battalion.

Thus there was a sub-stage of the 1st stage, not exhibited in the sketches, during which the battalion was divided into 1st line of two companies at 120 paces interval, and main line of two companies at 60 paces interval, and in this formation, and in the completed 1st stage we read of battalions moving to action over considerable distances, ready at any time to proceed to the stage of "execution."

Our battalion formation equivalent to this is skirmisher line, support and reserve. On the execution of the attack beyond this preparatory form our field exercise is silent.

In the development of the skirmisher line we should notice, that the principle is to break it into distinct groups answering to our sections.

Although, where the attack is being carried into execution, all traces of these groups speedily disappear, still the identity of the groups is to some extent maintained, and the chiefs of these portions of the line keep up a control which is never altogether lost.

The advance of the skirmisher line was made at the run of moderate pace until a point 600 paces or so from the enemy was reached, and then it lay down preparatory to the 2nd stage, to which I now call attention, the stage of execution.

Second Stage—Execution.

The order for its commencement was given by signal of the commandant.

Von Scherff discusses at some length the question of how the advance is to be made during this period, and to the pages of his work, treating on this subject, I refer the reader.

The method of this advance has been discussed in this country, and the experience of those who have served in the skirmisher line at peace practices is, that the rushing to the front of alternate groups while fire is kept up by those in rear, is calculated to unnerve the advanced portions of the line, and is in fact unsafe.

It is not necessary to go further into the matter now than to declare that the best method seems to be that of moving up in succession either from a flank or from the centre, and completing the line anew, step by step, 50 to 80 paces nearer to the enemy. Fire is, of course, opened by the new line, and fire is ceased by the old line as it becomes dangerous. This however is imperative, that the move forward should be executed with celerity and in good order by rushes and lying down.

While the fighting line was on the move between 600 paces and 400 paces from the enemy, it was constantly receiving reinforcements of $\frac{1}{2}$ zuge at a time ; this drawing on the reservoirs is for a double purpose, one, that of replacing casualties, is not apparent in peace manœuvres; the other purpose is to give to the firing line the greatest possible power to break down the strength of the enemy. At 400 paces the skirmisher line should according to Von Scherff engage in that "rapid independant firing," mentioned at page 55 and elsewhere.

Third Stage—Execution.

It is impossible to find in Von Scherff the several stages of attack described uniformly with the rules of the manœuvre as it was exhibited to me at M—and as it is depicted in the diagrams. Von Scherff's observations are not drill instruction, but the descriptions I have translated give the bona fide regulations for the manœuvre as now taught.

In the third stage the skirmisher line reaches a distance of from 300 paces to 200 paces from the enemy, and while this ground is gained the last zug of each company join it. The regulations say they are "not so much if at all extended."

It appears that at from 300 paces to 200 paces the line halts and the fire of increased power and rapidity commences.

The 4th company had received orders to join the fighting line, and this body adds the weight of its fire also.

The fire of all the close bodies was given in this manner; some fired a volley as they came up and then knelt and fired independantly over the skirmishers' heads, or they assumed at once the kneeling position and joined in the independant firing.

At some autumn manœuvres I saw züge and $\frac{1}{2}$ züge defending an important point, firing volleys over the heads of their own skirmisher line.

In peace manœuvres the line now appears to be very thick indeed, but I apprehend in actual warfare this is not so much the case. However this may be, the position has now to be wrested from the enemy, and after a heavy fire the crisis is supposed to arrive in about 5 minutes.

The signal is given and passed for a general attack, the bugles call, drums beat, and fire is kept up. The pace is not so severe until the last 50 to 60 yards, when the attack assumes a rush or "charge bayonets."

Fourth Stage.

During the fourth stage the object is to secure the further border of the position, to restore order, and to re-assume a formation preparatory to further attack on the enemy, or to receive any counter-stroke he may deliver.

Such are the considerations on the combat of a battalion, according to late German regulations, and the questions which seem to arise for our consideration are—

1st. Are those regulations dictated by common sense?

2nd. Are they applicable to our own battalions?

In regard to the first question I cannot perceive how any of us who have not been engaged in such recent warfare, are in a position to dispute in the matter. I think we ought to take it for granted that a highly intelligent body of officers, with such ample experience, have come to right conclusions.

If however there are any who still doubt, or who do not understand I advise them to visit the armies of Continental Europe now, and see for themselves; if this is not convenient I would recommend them to take

post at the marker's butts when independent file firing is going on, and to make a study of the records of the shooting.

With reference to the second query, to shew the applicability of the manœuvre to our British battalions of companies, I have drawn a set of diagrams representing the very same operations as performed by the German battalions in the various stages, giving the position of the companies throughout.

The Field Exercise provides for all preliminary drill, but the development of an attack either of a company or of the battalion is left to the individual intelligence of the commander.

It is not wise to leave the question in this unfinished condition, and practically few do so. Those that merely practise the manœuvres of the drill books are not preparing the troops for actual warfare.

In the hope of bringing the question of the form of our attack nearer to a conclusion, I submit a set of regulations for a battalion of eight companies, founded on the manœuvre I have described ; and those regulations being in extension of the rules of the Field Exercise cannot be said to forsake its prescriptions, but rather to bring them to a practical utility.

PART III.

The following rules are to be observed as regards the attack of Infantry, the battalion being supposed to consist of eight companies.

The attack is divided into stages—

1st Stage. Preparation.

2nd do. Execution.

3rd do. Execution and General Attack.

4th do. Recovery.

It is assumed that the battalion is in the usual quarter column rendezvous formation and told off into double companies.*

The word of command for the preparatory stage would be—"First and second double companies first line—third and fourth double companies second line." This formation is assumed at 2,500 yards from the enemy, or whenever it is required to be in a state of readiness to engage. In this formation the battalion can manœuvre or march in any direction. The intervals and distances are as noted in the diagram No. V. below.

1st Line. = 120 =

400

60

2nd Line. = =

The preparation for combat is completed by the extension of the half or the whole of numbers one and three companies by sections, covering, when the battalion is complete, a front of 350 yards.

In this formation it may be supposed the Infantry is lying down while the Artillery is taking its part of the action.

When the attack is determined on, the skirmisher line attended by the supports, proceeds at the double without firing, to a distance of 600 yards or thereabouts from the enemy.

150 yards is the distance suggested for the supports from the skirmisher line, but this will be regulated by circumstances.

Arrived at 600 yards from the enemy, the skirmishers throw themselves on the ground and commence a slow and steady fire.

2nd Stage. Execution. Diagram II.

The advance of the skirmisher line is thus executed. From one flank, whichever is most appropriate, a portion of the line runs forward making a rush of 50 or 80 paces, and having thrown themselves on the

* The manœuvre is equally suited to our more customary formation by single companies.

ground, the men recommence firing. In succession another portion of the line follows suit and aligns itself on the newly forming line. Thus the chain of skirmishers is advanced and reformed each time 50 to 80 paces nearer to the enemy. The portions of the line so moved successively forward should, if possible, be under the command of officers.

This operation is carried on rapidly, but with order and adroitness, until the skirmisher line reaches a distance of about from 300 to 200 yards from the enemy's position.

The directing section or half company is named, and sectional and half company and company commanders will take care that no deviation is made from the direct line of advance pointed out.

This regulation applies to a battalion having other battalions on either flank; skirmishers of detached or flank attacks make use of the formations of the ground under direction of their commanders.

At about 400 yards from the enemy it is necessary that the fire of the line should increase in rapidity and power. The control of the fire is the special duty of the officers and non-commissioned officers, who should be alert to watch for signals and the passing of words of command.

In order that the skirmisher line should have increased power at this period it will be reinforced by half a company from each of the supports before the distance of 400 yards from the enemy is reached.

In this manner from each support another half company should be added, section by section, or by the whole half company at a time, until one half company only remains intact in each support—thus the fighting line has all intervals filled up and it is thickened till it becomes one chain of skirmishers. In actual warfare the over thickening of the line apparent at peace manœuvres finds a remedy.

For a description of this stage see diagram No. II. If a whole company is extended in the first instance, there will be one half company less to send forward from each support.

3rd Stage. Execution and General Attack.

The fighting line while proceeding to the front is next strengthened by moving up the last two half companies close to the skirmishers. As they arrive they may fire a volley and lie down or at once kneel and add to the powerful independent file firing of the line, firing if the ground is suitable over the heads of the skirmishers.

The object of these unextended bodies is to give impulse to the attack; power of increased fire on definite points and solidity is thus given to meet counterstrokes of the enemy.

It will depend on circumstances whether these augmentations to the skirmisher line should be in single file or partly extended. The complete extension is deprecated as the object is to keep some bodies intact, under control, and thoroughly in hand.

At about the same time two companies of the Reserve or 2nd line are moved up with the same views, to points in the line as directed by the commander of the battalion. It is to be understood that all these bodies should arrive at the line of skirmishers just about the time when the distance of 300 to 200 yards from the enemy's position is reached. See Diagram III.

The heavy fire of the whole fighting line is poured in on the points indicated for attack, and about 5 minutes is supposed to bring about a crisis, and at a given signal the general attack is made by the continuous advance of the whole, the last 50 to 60 yards at the charge.

The remainder of the 2nd line, one double company, moves up to the distance of 200 yards from the fighting line, when the general attack is being made, and there halted is ready to oppose any counter-stroke of the enemy.

4th Stage. Recovery.

The enemy should be driven to the further border of his position and no further.

It is of the greatest importance that the attacking line should be kept in hand. At this stage supports should reform. Skirmishers should not leave cover in pursuit, but fire on the retreating enemy.

The battalion now indeed assumes the stage of preparation suggested in diagram No. IV. It is most desirable that at peace manœuvres this stage of restoration of order should be carefully practised, and it is a fitting conclusion to all such operations.

The teaching of the companies of a battalion should be in accordance with these rules, which can be easily modified according to the number of companies present.

The principle of the operation will be the same if the preparatory stage of the field exercise book is adhered to rigidly, without passing into the intermediate form of double companies.

The formation of two lines of double companies is exceedingly convenient, and particularly for battalions of Native Infantry, as it gives the control of these bodies to European officers.

In regard to the position of the commanding officer, it is suggested that he should generally be somewhat in rear of the centre of the supports; this is the most central position, and from there he can best watch the enemy and the effects of his attack. It is considered advisable to allow the captains full control over their commands, after giving them their objective and directions.

One of the majors should be placed with the reserve or 2nd line.

For second and third lines of battle no positive rule of formation can be laid down; it is however very probable that regiments may be brought up in line to complete the work of assault, or, deployed, covered with skirmishers, be ready to withstand counter attacks.

M. A. S. BIDDULPH, C. B.,
Brigadier General.

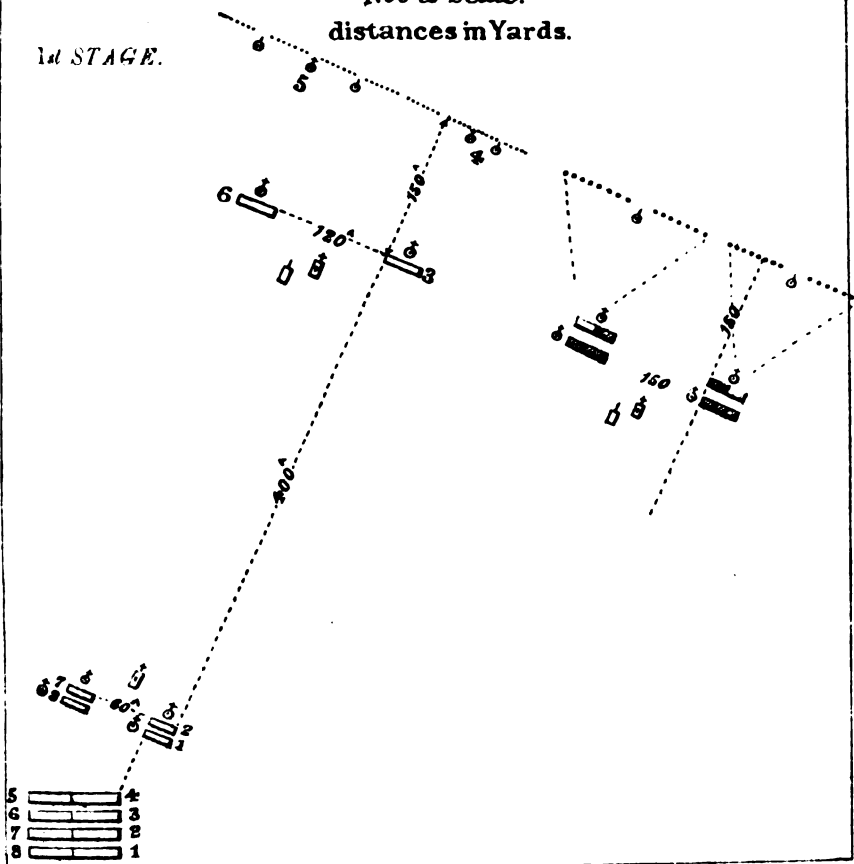
Sialkot, July 1875.

SKETCHES
of the
Adaptation of the Combat
OF A
GERMAN BATTALION
to a
BRITISH BATTALION

Not to Scale.

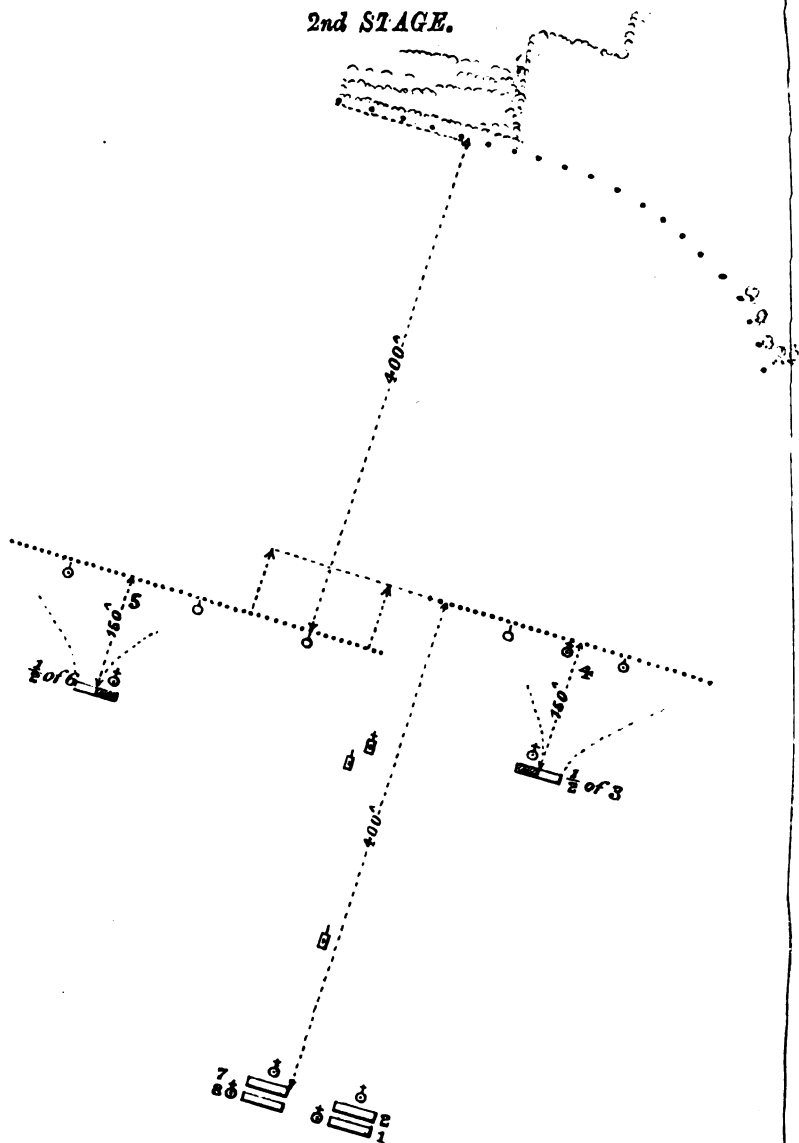
distances in Yards.

1st STAGE.

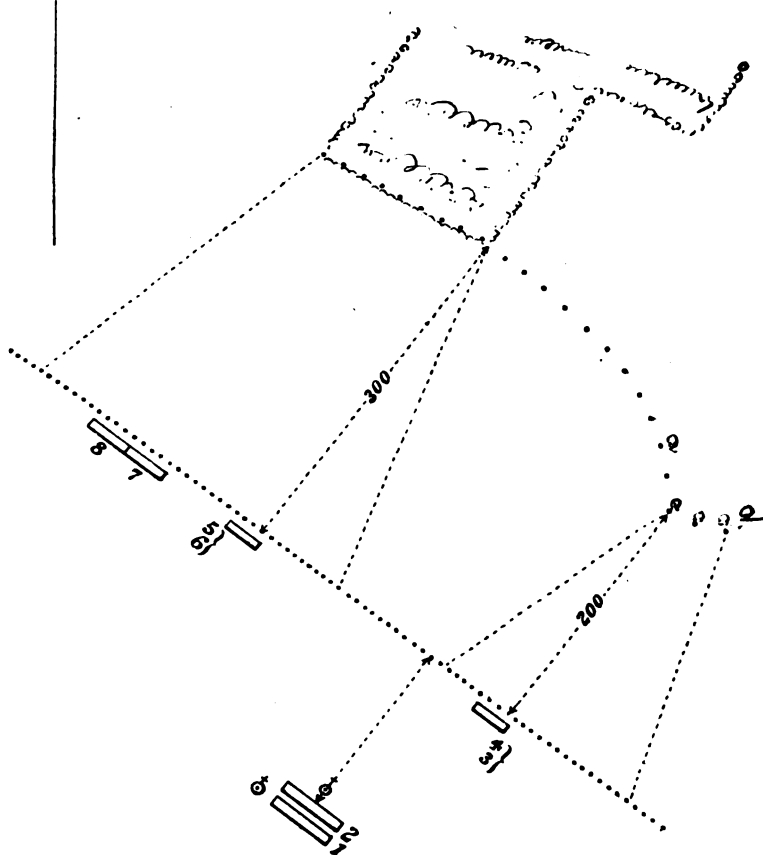


No absolute rule can be fixed for the companies extending as regards whether one or two should extend first or 5 and 6, or as in this case 4 and 5. This would depend on the formation of the Battalion at the time. Nor can there be any positive rules for the formations of supports and reserves, the formations and the distances should be regulated by the occasion and configuration of the ground. Thus there is no objection to the reserve being in line if this formation is considered more appropriate; small columns, however, are found most convenient in an intricate country, and flexible when on the move, and completely under control.

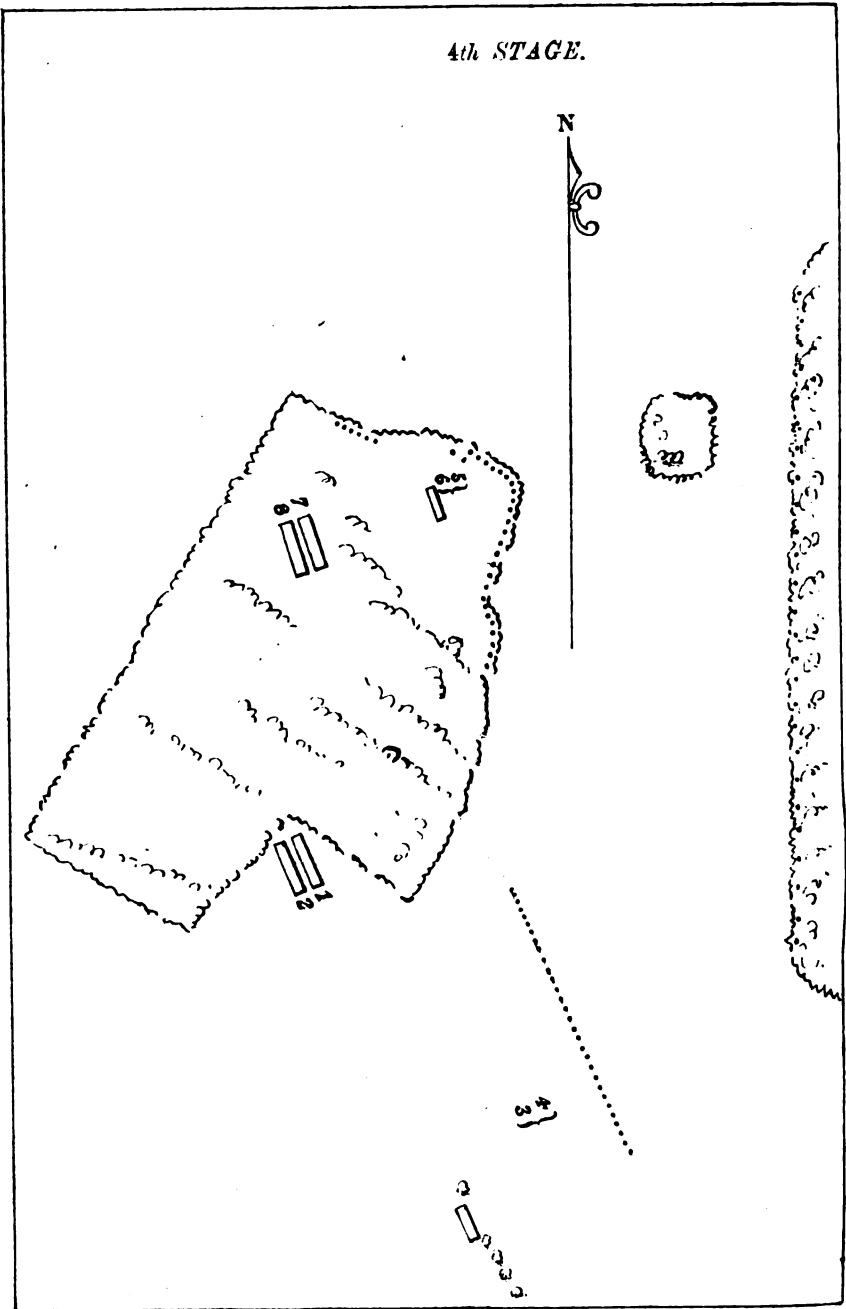
2nd STAGE.



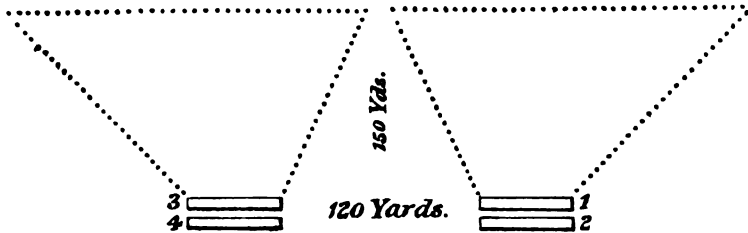
3rd STAGE.



4th STAGE.



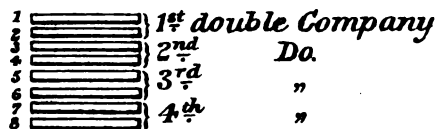
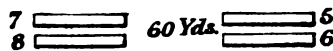
5th STAGE.



*Application to a Battalion
of eight companies in 4 Columns*

Two full Companies extended

400 Yds.



NOTE. — While the cannonade of the artillery is going on the Infantry in attendance would be in this formation.

This stage would be the proper one for passing through woods and over rough ground. It is evident that the subsequent stages of the attack, in a country having much feature, such as in ravines or mountains, will only require a partial development or such procedure as may be suited to the configuration.

III.

SUGGESTED ALTERATIONS IN THE JUDGING DISTANCE PRACTICE.

The remarks of the Commander-in-Chief on the 1874-5* annual musketry course of British Infantry and Cavalry shew beyond doubt that the present system of teaching men to judge distance is, when tested in the field, of but little value, and that it is difficult to carry out the regulation system itself in its integrity may be learned from the opinion of the Inspector-General of Musketry, who writes—"notwithstanding† the closest supervision the men probably have means of communicating their own judgment to others in a manner which defeats the most vigilant officers."

"Practically, the best judges of distance are not known." Let us then consider how these defects might be remedied.

In the wars of the future soldiers will no longer, as a rule, have to estimate the distance which separates them from a body of men in the open, but the distance of a single man advancing or lying down, the head of a man under cover or perhaps the partly visible body of a man behind a tree. Often they will calculate how far the object which protects their enemy is from them, as affording a better guide, rather than how far the enemy himself is. It follows therefore, that troops should be accustomed to judge not on men alone, but also upon prominent features of the landscape. I would therefore suggest the following plan. The Instructor of Musketry, having selected a spot containing natural advantages for cover within a radius of 900 yards, should supplement them with artificial objects until 8 points have been established. Thus for instance, the first mark would be a tree; the second a line of whitened chatties (representing men's heads in a shelter trench;) the third an old ruin; the fourth a man on horseback; the fifth the edge of a crop; the sixth a single man, standing; the seventh a large mound; the eighth a small section of men sitting down. The officer commanding the company, seating himself at the chosen spot with the register, would first record his own answers commencing from the right object. The non-commissioned officers and men, being formed up at a distance of at least 400 paces, would then march singly to the table, have their estimates written down, and pass on in the opposite direction. The distance would then be calculated by means of the stadiometer and points, the correct amount in yards entered in the registers, and read out to the men who would be brought back for that purpose. The points of each individual could be filled in at leisure, and the value of their answers and the number of periods need not be altered. For

* G. O. C. C. 10th Sept. 1875, page 428.

† Annual Report on the instruction carried on at the School of Musketry, Hythe, and of the progress of Musketry Instruction in the army during the year ending 31st March 1874, page 19.

purposes of classification it would be necessary to determine how many points should be scored in the twenty-four answers. Judging distance drill could remain as at present.

The advantages claimed for this scheme may be enumerated as follows :—

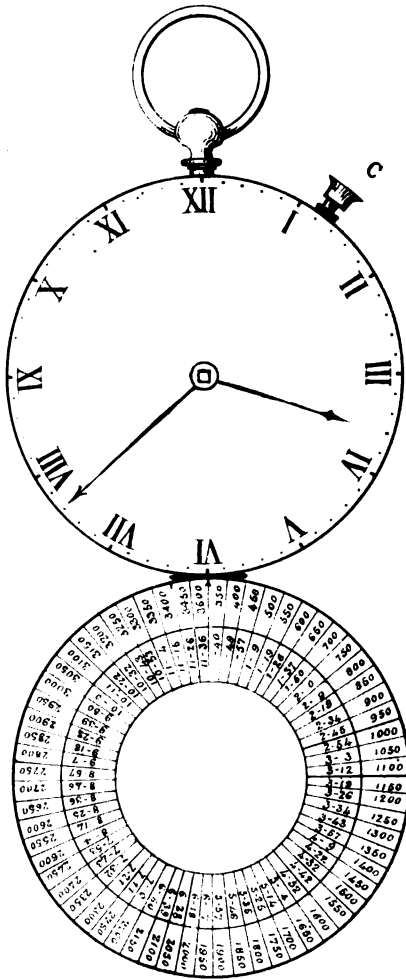
1. Men would have to rely entirely upon their own opinion, and knowing this it would be a great inducement for good shots to make themselves efficient, in order that they might be entitled to rewards granted by Government to a portion of the marksmen in a regiment.
2. The best judges of distance would be really known to company officers.
3. Consulting amongst all ranks would be entirely prevented.
4. A great temptation would be removed from non-commissioned officers. Many excellent men are annually tried for falsifying and improperly altering answers in registers. Nor will the recent memorandum* on the subject entirely prevent communication between them.

Gradually the true value of musketry training in an army, and the fact that drill is of but secondary importance, will come to be recognised.

C. A. FILLINGHAM, LIEUTENANT,
Instructor of Musketry, 65th Regiment.

* Hythe letter No. $\frac{14}{448}$, dated 31st March 1875.

WATCH TELEMETER.



IV.

WATCH TELEMETER.

GENERAL DESCRIPTION.

The telemeter exactly resembles a common watch in appearance, and its action when it is being used is the same as that of a watch when it is "running down." A small spring catch is placed on one of the wheels, so that, after the watch has been wound up, the slightest pressure with the finger on the spring catch (c) releases the wheel, and the hands fly round very rapidly, on removing the pressure on the catch both hands are stopped instantly, and the number of revolutions made by each of the hands is registered on the face of the watch since the instant the pressure was applied.

Thus in taking an observation, the telemeter is held in any position with the forefinger on the spring catch, on seeing the smoke or flash of the gun the finger is slightly pressed, and on hearing the report the pressure is removed, and the hands will register the number of revolutions, and sixtieth of a revolution since the flash was seen until the report was heard. It would only be necessary to graduate one telemeter from actual practice with a rifle and a field gun, on a measured range (say from 350 yards to 3 miles,) and any number of other telemeters could be graduated by observing the number of revolutions made by each in a certain time, and comparing these with the number made by the telemeter graduated in actual practise, in the same time. In this way all nicety of construction, and consequent expense is done away with, and any common aluminium watch could be made into a telemeter, by getting a watch maker to insert a spring catch, and making a register for it by comparing the revolutions of the hands in running down with some telemeter graduated from actual practise.

By graduating the telemeter from actual practise all error due to the slowness of the hands at starting is done away with, and the hands will have attained a uniform rate before the shortest range marked is attained (350 yards).

For convenience sake the register is kept in a circular form, inside the front case of the watch (shown in the diagram as opening quite back, whereas of course the case would open as usual in the outer case of a hunting watch). This particular register was made out from actual practise on a range, taking the revolutions at every 50 yards, with a rifle up to 1500 yards, and afterwards by measured distances from a station gun fired at midday, and from this any number of telemeters could be graduated. It happened in this particular register, that a difference of what would correspond to 10 minutes on the large hand of a watch represented a difference in distance of 50 yards. So that theoretically (as it would have been possible to read to half a minute on the large hand) the distance could be determined to $2\frac{1}{2}$ yards, but practically the readings for the same distance used to differ by 2 or 3 minutes, representing the personal error in observation, of between 10 and 15

yards; this however compares favourably with the error (50 yards) which was described as occurring with the Bouleuge telemeter at Hythe. In the telemeter above described, the number of revolutions and portions of revolutions, (and consequently the distance) may be read commencing with the hands in any position, but it would be better perhaps, for the sake of easy calculation, to press the spring catch down, and arrange the hands so as to commence from that position of the hands, which would be represented as the beginning of any hour on a watch.

For instance, suppose in the diagram attached that the hands had been in the position of say one o'clock exactly at the commencement of an observation, and that when the sound of the gun was heard, at the pressure removed from the spring catch, the hands were found to be in the position represented in the diagram, then the hands would have revolved through what is represented on a watch as 2 hours 38 minutes, looking to the register (2-34), is found to represent 900 yards and 2-45-950 yards. So that 2-38 may be taken as representing a distance of 920 yards.

Care should be taken in graduating a telemeter, either in actual practise, or from another telemeter, to wind up the instrument (as a watch is wound up) after some dozen revolutions of the minute hand, and also in taking observations, to wind up the instrument, after 3 or 4 short distance observations, or two or three long ones, so that the force of the spring which moves the hands shall be as far as possible subject to the same conditions when observations are being taken, as when the instrument was being graduated.

It may be mentioned that the telemeter above described has been tested on numerous occasions, and the results have always been wonderfully accurate: an officer using it with a party of sepoys out at practise for judging distance, obtained full marks for correct estimation of distance on every occasion on which it was used, and on a previous occasion it was tested with a field gun, at a range of over two miles, and the distance registered agreed with that measured with a chain, to within 15 yards. The uses of a telemeter, if an instrument could be procured which would give general satisfaction, would be manifold. More particularly might be mentioned the following.

To enable a battery of artillery, or a ship at sea, at the commencement of an action, to answer an erratic with a certain fire; and more particularly in siege operations, as it can be used by night or by day.

To enable time fuzes for shells to be more correctly adjusted.

To enable an officer with a prismatic compass, and a few assistants to make a hasty and accurate survey of a portion of ground.

The following seem to be the causes of any inaccuracies in the results when using telemeters.

1. The errors which it is possible for an observer to make, on account of the peculiar construction, or method of using the instrument.
2. The observer's personal error, which can be reduced by practise.
3. The error due to change in atmospheric condition, which it is impossible to avoid, but which under ordinary circumstances is very small.

From the description of the Boulenge telemeter and the report on the trial of it at Hythe, an error of so great a distance as 50 yards does not seem to be considered of much importance, but for surveying, and indeed for all purposes, such an error as 50 yards would be too great if it could possibly be avoided.

The liability to so large an error in expert hands at Hythe would seem to place the cause of this error under the head of the first of the causes of error mentioned above—from the following reasons :—

1st. The difference in time which two observers would take to bring the telemeter from a horizontal to a vertical position, and the same difference in bringing it back to the horizontal position again.

2nd. The smallness of the scale on which the readings are registered.

3rd. The liability of the runner to run one way or another when being read, on account of the telemeter not being held exactly horizontally, and the impossibility of clamping the reading immediately after the telemeter is turned back to a horizontal position, so as to read it carefully and at leisure ; this would be especially necessary in readings taken at night.

It is probably because none of these last three causes of error (or possibility of error,) exist in the watch telemeter, that it is found to give more accurate results than those reported as occurring with the Boulenge telemeter. It would seem to be a *sine qua non* in any form of telemeters, that the reading should be clamped, or unalterable, from the instant the sound of the gun is heard—and that an instrument in which the accuracy of the reading depends on its being held exactly horizontally in the hand, during the reading, must be especially liable to error.

G. R. R. SAVAGE,
Lieutenant Royal Engineers.

V.

CAVALRY PIONEERS IN THE AUSTRO-HUNGARIAN
ARMY—*Continued.*III.—DESTRUCTION OF A RAILWAY; CAVALRY PIONEERS ARMED
WITH THE DYNAMITE CARTRIDGE.

The Pioneer sections are provided with tools so as to be able to destroy in a few minutes a railway, over a length proportional to the time considered necessary for the interruption of traffic. It is a simple question of how many cartridges to employ.

With regard to this, the progress made in late years in Austria in the manufacture and employment of dynamite, have caused an order to be issued, that in time of war each pioneer section is to receive forty cartridges, each one containing 2·2 lbs. dynamite.

Each man of the section carries his cartridge in a pouch similar to the furnished valise, but smaller, and secured by a loop to the waist-belt like the cartouche box. Sometimes, especially in a winter campaign, it is found more convenient to carry the cartridge in the breast, buttoning the pelisse over it.* The miners employ the same means by putting their cartridges in their breeches pocket; the slight warmth of the body is sufficient to prevent the cartridge freezing in winter. The assumption of the solid form is the *only possible cause of spontaneous explosion.*

The regulation dynamite cartridge, No. 0, for cavalry is composed of a steel cylinder of oval base; the ellipse of the base has axes of 3·03 and 2·32 inches, and the height of the cylinder is 9·5 inches.

This box is filled with 2 lbs. (Austrian) of dynamite (2·65 lbs. English) in the *oily state*. When full, an opening is made, and a cylindrical mouth-piece attached to it to serve for the introduction of the fuze. This fuze-box is soldered to the cartridge case at its opening. By this arrangement the soldier never touches anything but steel in handling the cartridge, all the joints being soldered with the greatest care.

The fuze stopper is a cylindrical box 1·18 inches high, and 1 inch in diameter, it contains 0·3 to 6 oz. of dynamite. To prime, the cover is removed, and an end of Bickford's fuze is inserted into the opening, having a common cap at the end pressed on by pincers. The fuze stopper is then placed in the fuze and closed down. The cartridges, No. 0, and the fuze stopper No. 0, are carried separately by the men. The stoppers are only primed just before employing the cartridge.

* The Austrian Cavalry wear a blouse and a pelisse, "or tunic (besides the cloak). In winter, the tunic is buttoned over the blouse, in summer, it is hung round the neck by a cord—(Translator)

To give an idea of the degree of security which can be instilled into the men, it is observable that cartridges of this nature *thrown on rock from a height of 100 feet flatten out without exploding.*

This experiment is often tried before the men to give them confidence.*

Manœuvres for cutting a rail.—If a lieutenant of pioneers receives the order to cut a line of rail, he proceeds at once to inspect the spot proposed for the operation.

If he is left the selection of a spot in a long line of rail, he chooses one where the first train, or even engine, that leaves the metals will cause the greatest damage to the line, for instance—

1—Choose a place where there is a cutting, for the first carriage that leaves the rails will form a heaped up obstacle which must be removed.

2—A curve facilitates the smash.

3—An embankment the same, &c.

These ideas are imparted to the foremen of shops in their courses of study.

To cut the rails the lieutenant only employs two men, who are always foremen of shops, and often the serjeant and a corporal. A few moments before despatching them he recalls the principal directions to their memory, reminding them that by carrying them out strictly, they will be secured from the slightest danger.

Having made his reconnaissance, the lieutenant leads his section to within 300 yards of the road to be cut. At the word "*Prepare to cut the rail,*" the serjeant places the cartridge in his pouch, that hangs from left to right, and two fuze stoppers, one in his right hand, the other (in reserve) in his pocket. The corporal takes the match in his right hand. It is a metal match box with a chemical match *which he lights at once.* At the word "*March,*" the two troopers start quietly at the trot or canter, and at a uniform pace to the appointed spot. They stop at five or six paces from the rails, the serjeant passes between the metals, the corporal on his near side at the side of the rails. The serjeant dismounts, throws his reins to the corporal, who turns the horses' heads to the right rear, so that they may not see the match lighted. The serjeant now fixes the fuze stopper in the

* It is known that besides the well-known action of a fulminate explosion can only be produced in two cases.

—First if, by reason of excessive cold, the oily substance separates itself from the inert matter which acts as an absorbent. Hence there are special warming ovens for warming dynamite in the Engineer magazines.

—Secondly, by the concurrence of a smart shock and sufficiently raised temperature, such as the blow of a hammer violently delivered, rifle ball, or sabre cut, &c.

fuze box, takes the match from the corporal and advances a little, till he comes to a fish-plate joint, he then places the cartridge *in absolute contact* with the rail, loads it with a few handfuls of ballast, and before lighting the Bickford's fuze, throws a glance towards the horses to see that they are quiet and in their places. This done he lights the fuze, proceeds *leisurely* to his horses, mounts and gallops off as well as the corporal.

The fuze is calculated for forty seconds, and the troopers have ample time to get clear of danger when they are well instructed and selected.

It would be inconvenient to cut the Bickford longer, as the chances of its extinction augment after that considerably, and *apparent extinctions* constitute the only real danger of the operation.

Nothing is so dangerous as the re-priming of a fuze which has hung fire and may blow up after one has waited much longer than the time laid down in regulations for misfires.

As one must provide for all contingencies, if by chance the sergeant's horse refuses to allow him to mount, he must send it off with the corporal, and running fifty yards forward, throw himself on his face. He may have a shower of gravel thrown on him, but nothing worse. The rails are blown out in the, opposite direction, and it is only small pieces of sand, &c., that fly towards him.

The troopers should always return by the way they came, so as not to be stopped by an unforeseen obstacle. The result of the explosion is as follows:—the sleeper on which the cartridge is placed is cut vertically, or rather hacked through, all the fibres of the wood are dislocated and there is an interruption of six yards, of which four yards are thrown to a distance of about 300 yards in fragments, which may be about 18 inches long, and two yards at either end, are torn and twisted, and aid in helping the carriages to leave the rails. From the time when the section arrives on the ground near the spot, this operation does not take up more than five or six minutes.

To practise the troopers in this manœuvre, they are made to execute two preliminary practices:—

1. Detonation of a fuze-stopper placed on the railway.
2. Detonation with an empty box, for there is a certain amount of danger in splintering the steel.

Afterwards they proceed to the real destruction of a rail with the full cartridge.

The Austrian troopers are habituated to this work and carry it out successfully and rapidly. The damage done by a single cartridge requires at least a day's work to repair. One can imagine that it is

easy to increase the damage done according to circumstances, by multiplying the cartridges, either repeating the operation on the same spot or on points echelloned along the line.

Such is, in its entirety, the mode of organisation, and such the duties of cavalry pioneers in the Austro-Hungarian army. If we have explained the institution in the spirit of its eminent founder General Edelsheim, our readers will have seen that the principle on which he has insisted most firmly, is to make the pioneers, not merely skilled soldiers and in some measure the auxiliaries of the engineers, but trained horsemen, possessing before everything the qualities required by troops of the Advanced Guard, and in addition, a few leading practical ideas, easy to acquire in a few months, and attainable to all those of the annual contingent, who, by practice in their previous occupations, are able to turn earth or cut wood. Every-day experience, renewed under totally different conditions of recruitment has proved the possibility of attaining the required results, and has demonstrated their importance in a military point of view; we may add that one of the principal objections made, and perhaps the most serious one, that of the extra weight placed on the horses, has not shewn itself insurmountable, even with the small and lightly built horses of the Austrian cavalry; it would be less considerable for the stronger horses which form the average of our own cavalry remounts.—*Royal Engineer Journal*.

DESTRUCTION OF RAILWAYS AND TELEGRAPH LINES BY THE PRUSSIAN CAVALRY.

Cavalry is, on account of its rapidity of movement, the arm employed to cut the enemy from his communications by disaoling or destroying his lines of rail and telegraph. In order that this may be successfully accomplished, it is not only necessary to have the use of a certain equipment, but the troopers must have some knowledge of the railway and its accessories and must pass through a certain training. The Prussians, convinced of the importance of the services which a cavalry accustomed to these operations can render, have already provided their troops with the necessary equipment and instruction.

Cavalry in its expeditions can only attack the road and its accessories.

The Prussian theory is therefore confined to an acquaintance with the sleepers, the rails and the gear, fish plates and keys, spikes, dowels, railway chairs, and screw rings, as well as the details of the points and crossings, and to the explanation of their working by the aid of models placed before the soldier. The construction of a telegraph line is rapidly described: posts, insulators, &c., and then the method of destroying railways, &c., is described. We shall after describing the working of the system, recapitulate the principles formulated in the theoretic instruction.

REGULATION EQUIPMENT.

The tools carried by the Prussian cavalry are—

1. *The key*, with a long handle and finished by a claw hammer, is used to unbolt or draw out the spikes, trenails and keeper rings. It can twist or pinch the screws or rivet heads between certain limits. A chisel is attached to it.

2. *The auger*. This instrument, constructed to detach the chairs, is distinguished from the ordinary auger by the crook, which terminates the tongue of the handle. After having bored in the sleeper, at a distance of about an inch from the head of the chair, a hole equal in depth to about three-fourths of the length of the trenail, the workman inserts the crooked end and bearing down smartly in the direction away from the rail, smashes the trenail and the small piece of wood between it and the auger hole, enabling the rail and chair to be torn up.

Often the rail instead of resting directly on the wooden sleeper, rests on an iron pot-sleeper or plate. Then the bolt must be cut by the aid of the cold chisel on the *key*, a sledge hammer being used to give the blows.

3. *The petard*, formed of a dynamite cartridge and fuze. The cartridge contains 1·12lbs. of explosive matter enclosed in a triple envelope of parchment, tin and blue paper; it is in the form of a prism, whose base is a rectangle rounded at the angles. The upper disc of the cartridge has passing through it a gutta-percha tube, which penetrates into the interior of the substance, and leads to a small chamber entirely hollowed out within the dynamite itself.

The fuze is composed of a Bickford's fuze, 42·5 inches long, burning therefore from 110 to 130 seconds, at the end of which is attached a large copper cap containing a certain proportion of fulminate of mercury: then above the cap a sheath and collar just of the length to admit the fuze into the chamber in the dynamite at the end of the gutta-percha tube.

Packing the cartridges and fuzes.—Each cartridge is enclosed in a box of ash, the lid of which is bored to allow the gutta-percha tube to pass through; there is then nothing to fear from the bumps caused by the paces of the horse. Four of these cartridges are enclosed in a leathern case which is attached to the cloak by straps.

A packet of five fuzes (one in reserve) is enclosed in a steel case; the fuzes are folded and bound with thread so as to be easily withdrawn separately, and the steel case has again a leather pouch which is fixed to the cloak by straps.

Method of making a break.—To render a line unserviceable with the dynamite, one N. C. O. and two men are employed. The N. C. O.

directs the work, one trooper (No. 1) carries the cartridge case, and his comrade (No. 2) the fuze case. Arrived on the scene of operations, the N. C. O. and No. 1 dismount, giving their horses to No. 2. No. 1 draws a cartridge from its case and places it against a fish plate. He receives a fuze from his comrade, and the latter with the three horses retires about 150 paces, and obtains cover under or near the line of rail.

The cartridge should be placed against the rail near a joint or plate, to obtain the absolute contact necessary for a successful explosion, the cartridge is loaded with handfuls of gravel or lumps of wood; the end of the fuze which contains the cap, is then at once placed in the cartridge tube of gutta-percha.

No. 1 takes the other end, opens it with a knife, laying bare about an inch of the composition which is lighted by aid of a cigar,* or other body in ignition. The match lighted, the N. C. O. and trooper leisurely proceed to their horses and mount.

When the explosion has taken place, the little troop return to the spot to take note of the explosion and its effects.

If by chance one cartridge is not enough two are placed, side by side, one being fuze.

4. The cavalry hatchet is used to cut the telegraph posts and lines and to drive the wedges out of the chairs.

To cut a line, it is laid on the back of one Latchet and chopped with a second or with the cold chisel of the *key*.

5. *The grappling tackle*.—This tackle consists of two cramp irons and a band. It is the ordinary apparatus of a woodcutter. The workman carries in the belt two hatchets, and in his little pouch a skein of very fine silver wire.

He binds all the telegraph lines one to the other by aid of this wire, taking care when they are covered with rust or oxydised, to scrape them previously with a knife at the point of binding.

If there is no silver wire, threads can be drawn from the officer's fripperies (aiguillettes, &c.).

Transport of tools.—Each squadron is provided with the following equipment:—

Two cases of tools with key and chisel.

Two pouches with auger-jumper.

One case of cartridges.

One case of fuzes.

* Sic in original.

One grappling-tackle.

During the march all these things are carried in the squadron carriages, and only on an expedition they are fixed on the horses.

TO DISMANTLE A RAILWAY.

After these indispensable preliminaries, the Prussian instructions detail the method to be followed in destroying a railroad either with tools or with the cartridge.

With tools.—It is better to attack the line in the open country than near stations, where the destruction will be quickly perceived and easily repaired with the materials at hand in the depots. The choice of the actual point depends on tactical or strategical considerations.

When it is desired to conceal the work of destruction from the enemy, it should be commenced if possible on a curve. The chairs, bolts and keys of three consecutive rails are removed, and the rails are replaced. When a train arrives at the spot, the rails are driven outwards by centrifugal force and the train leaves the metals.

To be still more certain of obtaining this result, this operation is repeated in a second place within a mile of the first.

For this work the two keys and the two auger-jumpers may be used; the expeditionary detachment is then composed of an officer or N.C.O. and six troopers, two of whom hold the horses.

Not more than ten minutes are required for this work of destruction.

When on the contrary it is not thought necessary to hide the work from the enemy, the work is done as rapidly as possible tearing up one or two couples of rails on three points of the same mile.

This is how a detachment of six men armed with two keys and two augers, sets to work.

While two troopers tear up a rail with the keys, two others are detaching with the augers the bolts and trenails which hold the chairs of the one opposite.

These operations take place almost simultaneously, the men exchanging tools, and when the rails are sufficiently loosened all four lay down their tools, and standing inside pull together till the rail is dragged from its seat. It takes from eight to ten minutes to perform this operation.

If a more perfect destruction is contemplated, the materials are destroyed or thrown away instead of leaving them intact.

The rails are thrown into a marsh or watercourse. Or a bonfire

is made of the sleepers and the rails piled on the top, when they bend and twist with the heat and cannot be used without fresh forging, &c.

A twist can be given to the rails by putting the ends of them on piles of sleepers and making six men jump on them several times with their feet together, or by letting the rails fall from a height on another rail supported at its extremities by piles of sleepers.

Destruction with the cartridge (petard).—The damage done by the petards either in the open country or near stations, are always serious and difficult to repair, seeing that the repair must be commenced by relaying the earth and ballast. It is not to be lost sight of however that the noise of the explosion warns the enemy of the game that is being played, and of the presence of a hostile detachment in his neighbourhood.

It is as well in the open country to establish two or more consecutive breaks by applying cartridges against the joints. In curves the outer rail should be destroyed.

In a station it is indispensable to cut each of the lines of rail,* it is also desirable to smash the points and turntables which allow of the entry and exit of trains.

DESTRUCTION OF TELEGRAPH LINES.

If only the hatchet is used, the most rapid method is to fell several consecutive posts in a curve.

The detachment is composed of six troopers, two to hold the horses.

On the contrary, by climbing the posts and detaching the wires the two posts on either flank may be pulled down without hatchets, or the lines may be placed in electric communication one with the other by the method explained above.

As this operation is not easily recognized (by sight), it is a good plan to make an ostentatious display close by it by feeling the posts; then may the unsuspecting workmen repair one damage and return to the station to find the current still refuses to pass.

The detachment for this purpose is usually composed of six men; three to hold the horses, they are provided with the grappling apparatus and with the two hatchets besides the two held in the belt, for the purpose of cutting the posts. On emergency, with two men only a line can be dismantled.

If the line is to be used at a future stage of the campaign, the commander should be informed precisely, and in writing, what posts he is to destroy.

* Or in the country where they are double as in England.—(Trans.)

Lastly, the Prussian instructions finish by the following remarks on the destruction of lines of rail and telegraph.

1. No line should be cut without an officer's order.
2. Cavalry should profit by every opportunity to destroy the lines of rail and telegraph on the *rear* of the enemy.
3. In offensive movements all lines lying *between* the two armies are to be respected.
4. In retreat the Commander-in-Chief details the lines to be *preserved*, to be *dismantled*, to be *completely destroyed*.
5. In any case no work of art is to be destroyed without special order from the Commander-in-Chief.

Such is in whole the Prussian instruction. We have to thank Colonel Bilderling of the staff for familiarising us through the columns of the *Voennyi Sbornik* with the details of a service which might be usefully practised by our own cavalry.—*Royal Engineer Journal*.

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NOTICE.

Members are particularly requested to pay their arrears of subscription, either to the Secretary, or to the Alliance Bank, Simla.

Should any Member who wishes to cease, or has ceased subscribing, continue to receive copies of the Journal, it is requested that he will kindly communicate with the Secretary.

Members who have been on furlough, and have never expressed their intention of withdrawing from the Institution, are on their return to this country supplied with the journal and their subscription is due from the date of such return.

H. H. STANSFELD, LIEUT-COLONEL,
Secretary U. S. I. of India.

Simla, 15th March 1878.

NOTICE.

UNITED SERVICE INSTITUTION OF INDIA.

AN Exhibition of Military Drawings will be held at Simla during September 1876. All drawings intended for competition to be with the Secretary by the 15th September.

The first prize will be a Gold Medal, or vase or shield of Lucknow work, of the value of Rupees 100, and the second prize of the value of 50 rupees. All officers in India, whether members of the Institution or not, are eligible to compete for the above prizes.

The drawings to consist of Military sketches of ground, executed in the manner taught at the Garrison Instruction classes throughout India.

The first prize will not be awarded for a copy.

Two additional prizes of the value of 70 and 30 rupees respectively are also offered for competition to all non-commissioned officers and privates of Artillery, Cavalry and Infantry doing duty with their regiments in India. The conditions the same as for the officers' prizes.

The prizes will be awarded by a Committee of the Council.

By order of the Council,

H. H. STANSFELD, LIEUT.-COL.,
Secretary United Service Institution of India.

NOTICE.

MEMBERS of the institution who have not already done so, are earnestly requested to pay their arrears of donation and subscription, either to the Corresponding Members at their station, or direct to the Secretary at Simla.

Some members still owe their donation and three years' subscription.

Officers who may wish to become members, are requested to be kind enough to forward their donations and subscriptions at the same time as they express a wish to join the Institution, and also to inform the Secretary whether their subscription is intended to be for the current year which ends on the 31st May 1876.

Members can pay their subscription to the Alliance Bank, Simla, if more convenient, and the Bank will grant receipts for any money sent.

The entrance fee is 5 rupees and the annual subscription 5 rupees.

Members on changing their addresses are particularly requested to notify the change to the Secretary, in order that delay in forwarding the Journals may be avoided as much as possible.

The address book is corrected up to date from the Army Lists, but mistakes are occasionally unavoidable unless members themselves promptly notify their change of residence.

Members proceeding to England on leave, who wish the Journal to be forwarded to them while absent from India should inform the Secretary, and send stamps for the overland postage by Brindisi or Southampton as they desire.

When a member appears in orders for leave to England, his Journal is not despatched unless he asks for it, and while absent from India his subscription is not payable unless the Journal is supplied.

Members on return from furlough can obtain the numbers of the Journal that have been published during their absence, by paying the subscription for that period, and all members on returning to India should inform the Secretary of the fact at once.

The Secretary will be happy to send an Index to volumes I, II, III and IV to any member wishing for the same.

H. H. STANSFELD, LIEUT-COLONEL,
Secretary.

ORIGINAL PAPERS.

I.

ON THE ORGANIZATION OF THE COMMUNICATIONS OF AN ARMY, INCLUDING RAILWAYS.

By Lieutenant-Colonel R. HOME, C. B., R. E., D. A. Q. M. G.

A lecture delivered in the Royal United Service Institute.

THE subject upon which I am going to address you this evening is a dry one, but its importance is so great, that I feel it requires no apology for being introduced; although I feel that I should apologise for presuming to deal with so large and so complicated a question.

When I was asked to give a lecture at this institution, I looked through the various subjects that had recently been brought forward, and I found that no one had taken this special subject up. Feeling deeply impressed with its importance, I determined to try and read a paper on it, hoping that other and more competent persons may be induced to follow my lead. Our language is not rich in military terms, and the expression, *the organization of the communications of an army*, is a clumsy one to express what the Germans call "*etappen*"—a word which they have taken from the French *étape*. I know of no English term which expresses what is meant, and therefore I have used a term which was adopted during the Peninsular, our greatest war, for nearly the same thing. By the words, "the organization of the communications of an army," is meant, therefore, not the maintenance or repair of roads, railways, canals, or telegraphs, so much as the organization which enables an army to obtain the greatest benefit from those means of communication.

When an army advances into a hostile country it has to be supplied with food, ammunition, and other stores; it has to receive reinforcements in men and horses from the rear; and it has to send back sick or wounded men and horses from the front. If an Army of moderate size, say 50,000 men, simply marches 100 miles, without firing one shot, or seeing an enemy, the number of sick that have to be got rid of is very great. Experience has shown that, in a good climate, with abundant food, easy marches, and fair weather, the waste from ordinary causes in a ten days' march of such a force would be between 2,000 and 2,500 men, while the

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We read much of the battles round Metz: of the gallant conduct
 of two great nations; of the skill displayed by the
 on this side, of the mistakes made by those on that. We
 lists of killed and wounded, but we hear little of the many
 lives lost by fever, cold, hunger, and want round the beautiful
 of Lorraine.

Few realise the fact that an army requires as much food as a very large city; each day a large city receives its daily supply of food, there is no stint nor stay for those who can purchase; long custom and gradual improvements have opened up easy means of communication between the consumer and the producer. It is different with an army. An army is a city flung down suddenly in the country, each day moving, each day requiring fresh alterations in the arrangements by which food is conveyed from the producer to the consumer. Yet this portion of the art of war—one of the most important, if not the most important—receives but scant notice. "War is the art of being the strongest at any given place," and that portion of the art of war that keeps the greatest number of bayonets in the ranks, is surely not to be despised.

1, why this difficulty about food? The number of is but slightly increased when two armies meet; but in the two countries at war is really diminished. The answer lies here. Suppose there is an addition of ten mouths to be fed by the same force, if distributed. But suppose they are concentrated in one place, and requirements are altered.

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ing billeted on the inhabitants.

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azines.

Methods. In the first case, the Army is a body; the men would quickly become a part of the country. In a thinly peopled country the dispersion of the men in search of food would be so great that no progress to the front could be made, and the more they moved, the more they would exhaust the district where they were, and would simply starve, precisely as a bullock tethered by a chain will eat up everything in its circle, and if not moved, die from starvation, even in the midst of a rich meadow. This was the system generally adopted by the great Napoleon; it is one which we do not read much about in ordinary military histories, and into which we only get an insight by reading personal narratives of the wars at the beginning of this century. And it must be confessed, that the genius of Napoleon as a strategist and tactician appears all the more marvellous when the system under which he made war is considered. The marches made by the French Army Corps to blockade Ulm were made in this manner, and French writers say the men suffered severely for many days. Pillage showed itself in that, the finest army Napoleon ever commanded. This must be the invariable result of there being no magazines. A victorious army may march on a broad front in a rich country in such a way, but the moment it concentrates to fight, or halt, it is plunged into the greatest difficulties.

After the capture of Berlin in 1808, when the French undertook the winter campaign in Poland, their sufferings were very great; whole corps disappeared, broken up into bands of marauders seeking food in the scattered farms of that inhospitable country.

The serious check received by the French Army at Eylau, was caused by the demoralisation consequent on this system. The resources of a country cannot be utilised by an army marching through it, they are wasted and lost.

number of galled, foot-sore, or worn-out horses would also be very large. A few wet days or a sharp engagement would raise the number of both very considerably. An inefficient man or horse at the front is a positive disadvantage; he can do no work, and he consumes food which is difficult to get, and often occupies the time of a sound man by requiring to be looked after; consequently, if an army is to be kept efficient in front, there must be a stream of men and horses passing along the lines of communication from the base of operations in the rear to supply the waste in front, and a succession of depots where sick men and horses may be tended, cured, and again sent to the front.

Further, an army must be fed, and the magnitude of the operation is what many people rarely consider. The action of an army in the field, its marches and its battles, the lists of killed or wounded are what chiefly strike the eye of the looker on; when a man is killed or wounded, or even when he is taken prisoner, his loss is chronicled; but the man is just as much lost if he dies or is invalided from want of food or medical aid. We read of so many killed, wounded, and prisoners, and of so many guns and standards captured; but who notices the losses from privations and hardships? Yet the losses from the latter causes, far outweigh those from the former. We read much of the fight at Magenta and the battle of Solferino. Volumes have been written in which you will find accounts of both in the greatest detail; but we rarely see an account of the sufferings endured by the French Army from the 9th to the 17th June 1859; during the first few days, the troops were ordered to live on the peasants, and latterly, although in a friendly country, the order was repeated, with the words added "even to complete exhaustion"—words never used except in the direst extremity.

We read much of the battles round Metz: of the gallant conduct of the soldiers of two great nations; of the skill displayed by the Generals on this side, of the mistakes made by those on that. We read long lists of killed and wounded, but we hear little of the many human lives lost by fever, cold, hunger, and want round the beautiful city of Lorraine.

Few realise the fact that an army requires as much food as a very large city; each day a large city receives its daily supply of food, there is no stint nor stay for those who can purchase; long custom and gradual improvements have opened up easy means of communication between the consumer and the producer. It is different with an army. An army is a city flung down suddenly in the country, each day moving, each day requiring fresh alterations in the arrangements by which food is conveyed from the producer to the consumer. Yet this portion of the art of war—one of the most important, if not *the most important*—receives but scant notice. "War is the art of being the strongest at any given place," and that portion of the art of war that keeps the greatest number of bayonets in the ranks, is surely not to be despised.

It is often asked, why this difficulty about food ? The number of mouths in a country is but slightly increased when two armies meet ; the total number of mouths in the two countries at war is really diminished. Why then this difficulty ? The answer lies here. Suppose there are 10,000 bakeries in England, an addition of ten mouths to be fed by each would make but a slight difference, if distributed. But suppose the additional 100,000 mouths all concentrated in one place, and requiring to be fed all at once, the circumstances are altered.

There are really but three ways by which, or by modifications of which, armies can be fed in the field :—

1st. The soldiers may obtain food by being billeted on the inhabitants, or by living from hand to mouth as they march.

2nd. The whole of the provisions may be carted after the army.

3rd. The army may be fed from magazines.

Let us consider these three methods. In the first case, the Army would soon cease to be a military body ; the men would quickly become a mob of marauders, and cease to be an army. In a thinly peopled country moreover the dispersion of the men in search of food would be so great that little or no progress to the front could be made, and the moment a halt took place, the troops having exhausted the district where they were, would simply starve, precisely as a bullock tethered by a string will eat up everything in its circle, and if not moved, die from starvation, even in the midst of a rich meadow. This was the system generally adopted by the great Napoleon ; it is one which we do not read much about in ordinary military histories, and into which we only get an insight by reading personal narratives of the wars at the beginning of this century. And it must be confessed, that the genius of Napoleon as a strategist and tactician appears all the more marvellous when the system under which he made war is considered. The marches made by the French Army Corps to blockade Ulm were made in this manner, and French writers say the men suffered severely for many days. Pillage showed itself in that, the finest army Napoleon ever commanded. This must be the invariable result of there being no magazines. A victorious army may march on a broad front in a rich country in such a way, but the moment it concentrates to fight, or halt, it is plunged into the greatest difficulties.

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The serious check received by the French Army at Eylau, was caused by the demoralisation consequent on this system. The resources of a country cannot be utilised by an army marching through it, they are wasted and lost.

We now turn to the second method, that by which an army is fed by provisions carried with it on waggons; this is possible for a very small force, but for a force of any magnitude it is impossible.

The Count de Paris has furnished a remarkable calculation on this subject. He says, one road will suffice for only a limited number of carriages, if several roads are available, the number of waggons must be limited, otherwise the army cannot move.

A six-horse waggon will carry 2,000 lbs.; and the supply for each man per day, medical stores, ammunition and food included, may be placed at 4 lbs. per man.

Such a waggon will supply 500 men for one day, but if the army is a day's march from its base, it will only supply 250 men, for it must go back empty to re-fill at the base. If it is two days from its base, 4 waggons for 500 men are requisite, or 8 per 1,000 or 800 waggons for 100,000 men. But if the army of 100,000 men includes, as it would do, 16,000 cavalry and artillery horses, 200 waggons would be requisite to carry a day's forage, or 800 if the army was two days' march from its base; or 1,600 waggons, horsed with 9,600 horses; but these waggons would be three days away from the base and one day there, consequently they would require 360 more waggons, horsed by 2,460 animals; to feed them, these would require 92 additional waggons, and so on, until we arrive at a total of 2,000 waggons, horsed by 12,000 animals, as being absolutely requisite to feed an army of 100,000 men two days from its base of operations. If the army advances one day further, or three days' march from its base, it would require 3,760 waggons horsed by 22,000 animals, a column 38 miles long if the intervals could be kept; but which would extend over 48 miles or the whole four marches and even this number of waggons does not give a true picture, for there must be a fresh set of waggons to carry the food from the divisional depôts to the regiments. To move ten days from the base of operations, on the basis furnished by the Count de Paris, would require 10,975 waggons, horsed by 65,850 horses. This is a number which it would be practically impossible to deal with, covering no less than 108 miles if the distances be kept, but which would really be more than the whole length of the ten days' march.

The third method, or that of magazines, is consequently the only sure, safe, and possible means of making war, provided it be judiciously combined with a system of requisitions.

Along the roads, railways, or canals forming the line of communication of an army, there must be two distinct streams always flowing, viz., that which supplies the army with fresh or convalescent men and horses, as well as food and warlike stores of all kinds (this stream flows from the base to the army), and that flowing in the opposite direction, which carries back sick and wounded men, horses, and prisoners, either to depôts on the line of communication, or to the base itself, and also the empty waggons returning for fresh supplies.

It is manifest that there must be some organisation which shall keep order and discipline amongst the heterogeneous masses which compose these two streams; which shall form depots in proper places; see to the supply of the sick and wounded; push on what is urgently wanted; economise and utilise the resources of the country whether friendly or hostile; direct those resources to proper places; maintain and repair the telegraphs, roads, railways, and bridges; garrison important points; protect and patrol the communications; check disorders; look after the dispatch of letters; and lastly, be such that with but a short delay, can direct the whole of the vast traffic into another channel, if the movements of the army necessitate this being done.

This organisation which the Germans term *etappen*, and which I have paraphrased as the "organisation of the line of communications of an army," is that portion of the military art where study and forethought come most into play. It is that portion of the science of war, where the bright scintillations of genius, the sudden inspirations of the heaven-born leader, can do little or nothing. But it is on that account the more important; as careful, accurate, painstaking, study, and forethought applied to it, will go far to remove many of the indeterminate causes which mar the most brilliant schemes.

In war, there can be nothing absolutely fixed, nothing rigorously systematic. But while this is true, it is equally true that the military machine is composed of many different parts that cannot be made to work for one end, unless they all fit into a well arranged scheme. If all the details of such an organisation be not clearly sketched out, well understood and thought over by every one, no amount of inspiration or feverish excitement will make things go straight when the machine is tried.

I quite concede that such an organisation can only be tried in actual war, cannot be exercised in peace; but granting this, I believe that if the principles of such an organisation be clearly laid down, and the functions of each person well understood by all concerned, the organisation itself will quickly get into working order when wanted.

While then rigidity of form is inadmissible, yet it is desirable to have a standard or model, to reach which every exertion should be made, even although such a standard may never be reached. It is very desirable in this matter, as in everything else, to establish some definite and clear principles of organization; details, however important, quickly arrange themselves if the framework or sketch be based on sound principles.

The first great principle which I believe modern experience has pointed out, is the division of the whole subject of supply into two great branches.

1st. That which works in rear of the army.

2nd. That which accompanies the army.

These two great branches should be perfectly distinct, their functions are different, and the class of men and conveyances to be used is in each case different.

The function of the first is to look after and forward stores massed in large depôts, and to push them up, as far as possible, after the army. Referring to the illustration of the bakeries in England, it is the duty of the organization in rear, to seek out, as it were, the food which each soldier would have eaten if he had remained at home, or in garrison, and to send it after him.

The function of the second is to bring up the food from the advanced magazines to the divisional depôts at every opportunity, more especially during halts, and at the same time to seek to utilise the resources of the country by requisitions in the immediate neighbourhood of the marching troops.

It is manifest that the service in rear may be of a semi-civil character, the transport may be by rail, hired vehicles, or canals, while the service in the front must be military, and must be performed by bodies having a military organization. As an army advances into a hostile country the requisitions in the immediate neighbourhood of the line of march will have, to a certain extent, exhausted the country; one object then of the semi-civil organisation following in rear, will be to extend the area of requisitions, and to tap fresh supplies. In every case the furthest advanced point of the department working in rear should be as near as possible to the army in front, should follow it and keep, if possible, within one or two marches of it, relieving the guards and detachments left in rear, completing any work that may have been done by the advance, strengthening bridges, repairing roads, laying telegraphs and bringing up supplies. The transport working in front must, to prevent confusion, be under perfect military control, and must be able to bring up the supplies from the rear, that is to say, from the head or advanced portion of the rear organization to divisional depôts.

But the food or supplies have to be carried from those divisional depôts to the regiments themselves, and a fresh organization is requisite for this, which, being responsible for the supply of the units within the division, that is to say, the battalions, batteries, and regiments, must be a part or portion of these battalions, batteries, or regiments themselves.

Thus we are led to a division of transport into three portions, and I beg to draw attention to this division, for in it, I believe, lies the key of success in this branch of the art of war, a division of transport into—

1st. General transport, embracing railway, canal, and road transport, working along the line of communication from the base to the most advanced magazine.

2nd. Departmental transport, which shall convey the supplies from the advanced magazine to the divisional depôts.

3rd. Regimental transport, which shall bring the supplies from the divisional depôt to the battalions, batteries, or regiments.

Accuracy of detail and economy of power are only to be found in an intelligent division of labour. By such a division of the transport, the smallest portion is that which, having to be always close to the troops on all roads, and even in the fields, must be highly organised and well horsed. The Departmental transport, which need not move so rapidly, and generally moves at night, and always on roads, may carry heavier loads, or, what is the same thing, may use fewer horses,—while the transport working on the line of communication may, if it is not railway transport, be waggons hauled by relays of horses, pressed from the inhabitants and working a stage close to their own homes, thus avoiding the necessity of sending men and horses to the front, and further, relieving the magazines of the task of feeding horses and men so employed. The first description, General transport, must be under the commandant of the line of communications, and under him alone; the second description, or Departmental transport, must be under the heads of departments—artillery, engineer, and commissariat; and the third, or Regimental transport, must be under the officers commanding regiments. When I say the transport is to be under these different directions, I mean not that the horses detached for any one service are invariably to be so employed, but I mean that these are to be their normal or general duties; it being always distinctly understood that any horse or any man in an army is liable for any duty the General commanding may choose to order. It would appear almost needless to say this, but it used to be an axiom in the French army that the “intendant” was responsible for the supply of food, the commanding officer of artillery for that of ammunition, and the commanding engineer for intrenching tools, each having his own train, while the general was responsible for handling the troops in action. This led to its natural results, the heads of each branch of the service rarely helped one another, and the general, shorn of half his attributes, lost his power. In an army-corps, division, brigade or regiment, the commanding officer is alone, and can alone be responsible, for not only handling, but also for supplying the wants of his men. He may, and doubtless must have persons under him responsible to him for carrying out certain duties, but their responsibility is to him, and to no one else.

Many of the arrangements adopted in foreign armies, and which are too often supposed to be modern discoveries, will be found to have existed under different names and altered circumstances, in the Peninsular War. Wellington began with no organization, but originated as he went along, and his organization, adopted from experience, was in principle almost identical with what now holds in the German army. It is well worthy of study as given by Gurwood.

These were—1st. The regimental mule equipment (pack animals, to follow the troops through the difficult country they had to traverse in Spain). 2nd. The departmental transport, represented by the artillery train, the engineer train, and the commissariat train. The two first chiefly, though not altogether, composed of the corps of artillery drivers, and the latter composed chiefly of the Royal waggon train, while the general transport was represented by vast numbers of hired carriages and animals, comprising the ordnance and commissariat transport, and by boats on the Tagus and Douro, worked by seamen; the whole of the latter being under the general direction of the officer in charge of the communications. Allowing for the altered circumstances, and the absence of railways and telegraphs, the system used in the Peninsula by Wellington was very similar to that now adopted in Europe, with, however, one important difference, to which your attention will be shortly directed.

Viewing then the question generally, we arrive at this point, that if an army is to be kept up to its fighting-strength in front, the communications must be worked by an organization separate and distinct from that in front. It is by no means meant that this organisation should be distinct from and independent of the general commanding the army, far from it; the organization working on the line of communications should occupy the position, as regards the army, that an army-corps does, that is to say, the officer in command of the communication should hold to the general commanding, the position that an army-corps leader does. This is most distinctly laid down in foreign armies. If an army corps is working by itself it is really composed not of two, but of three divisions—one taking charge of the line of communication, and not being classed or counted as troops of the fighting line; similarly, if several army-corps forming an army are working together, there is another on the line of communication not counted or classed with the fighting troops.

Now this is the point where the modern foreign organization differs from that of Wellington, a difference undoubtedly caused by the small force at Wellington's disposal.

He was obliged to endeavour to look after his communications by means of detachments and convalescents—the results were constant abuses. We read continually in the pages of Napier of the cavalry regiments being dangerously weakened by detachments acting on the line of communication really as military police. We read of constant abuses arising from convalescents being detained in rear, and the fighting battalions in front being thereby weakened. Now in modern armies the force told off for the communications is complete—it has its own battalions, its own commissariat, artillery, and engineer staffs, which hold to the heads of those departments with the army the relations that similar officers do in divisions to the senior officers of those departments. Thus the troops in front are never weakened by detachments, and a division of 10,000 men on paper is really as nearly as

possible of that strength on parade. The advantages of this as regards discipline are enormous—units such as regiments or battalions are not broken up to find garrison for this post or that important railway junction.

There is nothing more remarkable in examining from time to time the strength of the Prussian army in France, than to see how closely the real strength of each corps corresponded with the regulation strength.

The advantages of doing away with detachments is too well known to require to be dwelt on here.

Indeed, if an army were to advance into a hostile country without such organization, it would soon reach the end of its tether, the fighting men in front would be gradually disseminated along the whole line of communication, and nothing would be left in front to meet the enemy with.

In every army, there are and must be a very large number of semi-military bodies, that is to say, bodies possessing a certain amount of military organization, and yet whose function is not to fight but to work for those who do. These bodies are invaluable; but in front their presence is absolutely hurtful; in rear their duties are all important; amongst these bodies, are the bakers, the butchers, the great mass of the telegraph corps, the railway corps, and a large proportion of the medical department. Further the protection and guard of the various posts in rear may be given to troops, inferior in marching power to those in front, and consequently we are again brought by another set of reasons to the fact that a separate and special organisation is required for the line of communication.

Nothing more clearly demonstrates the value and importance of a careful preparation of these details than the Franco-German war. Prussia conquered France, not so much from valour on the field of battle, as by the most painstaking care in every detail.

As the Prussian army advanced it drew Prussian civil institutions after it and the French statement, that France was invaded not by the Prussian Army but by the whole Prussian nation, was literally true. As a general statement, it may be said that the collection of supplies at the base of operation, is really the work not of the military leaders so much as of the civil administration of the State.

Acting on this idea, Coblenz, Mayence and Mannheim were the bases, or great dépôts of the German Armies at first, stores were accumulated at these places chiefly by the civil government, organised bodies in charge of the communications worked from those points to the army, gradually as the army advanced these semi-military bodies followed; and were in their turn followed by a civil organisation. First, a Governor of Alsace was appointed, next a Governor of Lorraine

and each functionary exercising the civil government of the State, allowed the semi-military bodies in charge of the communications to be pushed to the front, and finally the grand dépôts originally on the Rhine, were pushed to the Moselle.

The force in front thoroughly military, gradually shading off along its line of communication to the civil governors of the various provinces in the heart of Germany, where each corps had its home and peace station. The young unmarried men being in front, fighting and exposed, the older and married men in rear, each in proportion to his age and his power doing his country's work.

To place highly trained military bodies to guard communications, to see after the police duty, to prepare relays of horses, or convoys of stores, is manifestly a waste of power. Looking to the two recent campaigns of 1866 and of 1870, it appears that in this organisation, the Prussians showed their superiority more than in anything else, the whole power of the State being devoted to one object. The Military Estimates in peace maintained the fighting men, and but a very feeble nucleus of these semi-military bodies; their peculiar institution of universal service enabling them to put their hands on as many men as they required at a moment's notice.

Thus when war broke out, every man in the country found his place, in the vast machine by which the fighting men in front were kept supplied. The French Army had no such organization, and was so frittered away in detachments, and there was so much confusion, pillage, and waste in rear of their army, that taught by experience, the new French Military laws provide that men, who from their stature, or some slight physical infirmity, are not placed in the ranks, are enrolled for these auxiliary branches of the Army. In war the more complex the military machine becomes, the more important becomes the moral power of armies, and I would venture to observe that armies only get more complex, because society itself gets more complex. Because discoveries and inventions introduced into civil life are adopted into armies. Because, in short, men are better educated, and the general standard of knowledge is everywhere higher, consequently moral force, as a lever that sways bodies of men of the size of modern armies is more important now than when Napoleon said it was three times as important as physical force. Nothing tends to preserve moral force in armies so much as well ordered communications. It is not merely that regular supplies of food are brought up, that the men are regularly fed, although that goes for something, but the sick and wounded are got out of sight rapidly. Men's minds are not allowed to dwell on horrors, and above all, the reinforcements coming up from the rear, seeing regularity, order, and strict discipline in the rear of the army, are impressed with the sense of power of the whole machine at work, and spread a healthy tone through the ranks they join.

It has often been said, and with great truth that German military institutions have not been tried by defeat, that a concatenation of peculiar events has helped Germany in her great successes. This most undoubtedly is true; but if we examine her military institutions, we shall find that her leaders take precisely this view, and they have striven to produce a system that shall be available in the day of defeat as well as in that of victory; and nowhere is this anxious care more evident than in the organization of communications.

The service working in rear must therefore have a special and separate organization. In Germany (France and Austria have followed German arrangements to a great extent) there is an officer who commands the whole line of communications; his place is with the General commanding, or one march in rear of him, and under his orders he has six distinct branches working,

- 1st. The route service.
- 2nd. The railway service.
- 3rd. The field intendance or commissariat.
- 4th. The field medical dépôt.
- 5th. The route telegraph.
- 6th. The field post office.

Each of these departments has its own head, and each is of a civil, or quasi civil character. Each has its purely military branch in front.

The telegraph department is a good example of the way in which the civil shades off into the military.

It is divided into three distinct branches all under one head.

- 1st. The State or home telegraphs.
- 2nd. The route telegraphs along the line of communication, usually a light overhead wire.
- 3rd. The field telegraph detachments which communicate with the division and army corps. The latter being under the Generals commanding, the Director of military telegraphs deals with them through the generals.

As the army advances, the route telegraphs are rapidly laid, and the first, or State telegraph department follows and completes the work, connecting it with the general telegraph network of the kingdom. The Director General of State Telegraphs having as his assistant, or deputy, the Director of Military Telegraphs.

Thus there is no attempt to spread the field-telegraph-detachments out along the line of communications; being well horsed, and an entirely military body, their functions are to make a line each day to unite the

divisions, a line that must be rolled up and re-made the next day. The route telegraphs are more permanent but less military in their character, the great object being to push the State telegraph as rapidly as possible in rear. Thus by a proper division of labour the actual number of soldier telegraphists is but small, and the money spent by the State on soldiers is thus kept as much as possible to pay for actual fighting men, those who work in rear, being on account of their prospective service in this way, relieved of a certain portion of the service they otherwise would have to do in the ranks. Men so employed do not require periodical training as soldiers, they do not require more than a distinctive dress and a habit of respect for superiors. I do not now propose to attempt to describe these six divisions or branches of the communications of an army, but I cannot dismiss the second, or that of field railways, without saying a few words on this very important special branch of the subject.

The use of railways has introduced great changes into war, and it is believed that these changes may be summarised somewhat as follows:—

Viewed strategically, they have given an enormous power in concentrating masses of men and horses from the distant portions of a country on certain points; such concentrations in short as those effected by the Germans in 1870, on Coblenz, Mayence, and Mannheim. Viewed tactically, their use is restricted. Armies may be massed by these means at a secure distance from an enemy in a short time; but the moment that the distance between two contending armies becomes such that a powerful force must be ready to form in line of battle to meet an opposing army, the railway becomes for the purpose of moving troops of little value; but for the purpose of supplying troops, and removing sick and wounded, its value is at all times very great. Although universal compulsory service is more than sixty years old, I think we may fairly doubt the possibility of keeping the vast armies in the field that are thus placed in it, if railways did not exist. Suppose there had been no railways during the recent Franco-German war, I think it is exceedingly doubtful if Germany could have kept 400,000 or 500,000 men in the field. No amount of waggon transport would have fed them in France; and if such a force had attempted to advance, feeding on the country, it must have spread over so wide a front to seek subsistence and its power to concentrate would have been diminished to such an extent that its numerical value would have been greatly reduced.*

Railways must, therefore, be viewed in two distinct lights:—

1st. As means for concentrating armies from distant points, and placing them on the theatre of war.

* The invasion of Russia by Napoleon is a case in point. Many writers have carefully examined this great episode, and all agree that no organisation of cars and wagons could have fed so great a force so far from its base, but that a single line of railway would have done so with ease.

2nd. As means for supplying those armies while operating on the theatre of war.

This division is really that between railways actually in the zone of military operations and outside it.

In the former case the military element predominates; in the latter, the civil.

It is manifest that there must be a line of demarcation between these two. This the Germans term the transfer station. Take for instance, the advance march of the Germans from the Rhine towards the Sarre. The Rhine was for some time the dividing line, Mayence, Mannheim, and Coblenz being the transfer stations. East of these points the civil element prevailed; west, the military element was all powerful. The object being as the army advanced, to push these transfer stations after it as quickly as possible, they were moved first to the Moselle, and subsequently to the Meuse, in each case the civil railways of the State extending their field of operation further to the west, and allowing the military organisation to follow the army. The reason of this distinction is, that an army in the field depends for its supply on the productions of the country in rear of it, and it becomes essential not to dislocate the means of production, and to interfere with the trade and commerce of the country as little as possible. At the same time it is requisite that for a certain space in rear of the army it should have complete control over the railways; hence a station must be selected where the separation takes place. The French made no such separation, and the consequence was that all kinds of stores, men and horses were sent from all France to the Army when actually in motion, there being no halting place out of the immediate zone of action, where the mass of supplies so sent could be arranged and forwarded as required, consequently the railways immediately in rear of the army were blocked and useless, the waggons containing the things that really were wanted never could be got at. I know of no more extraordinary description than of the blocks of railway carriages in rear of the French Army at Le Mans, or in the town of Metz.

At the latter place nearly 7,000 carriages were blocked together in a solid mass; none of the people on the spot knew what the waggons contained—ammunition, food, clothes, arms, intrenching tools, pontoons, and hospital arrangements, being mixed up in a confused mass—the power of the railway as a carrying agent being destroyed by its carriages being used as moving magazines. Had a transfer station been used much of this confusion would have been prevented.

There is always a tendency to follow the lead of those who have been successful, and consequently since the successes of Prussia, there is a great tendency to Prussianize military matters. There is danger in this. There can be no doubt that, broadly speaking, the principles of war must be the same in every country, precisely as the principles

which govern the administration of justice, the principles of music, painting, sculpture, &c., amongst civilised nations are identical. But each nation works out those principles in a different way. And any one who is a judge, will tell a French picture from a German, French music from German. So it must be with war—the principles which, each nation has to deal with are identical. But in working those principles out, the peculiar idiosyncrasy of the nation must come into play. The outline of the picture in each case will be the same, but the colouring and detail will vary.

I am far from thinking or urging that we should adopt German customs in this country. But it is well to see what German customs are, and how the Germans have worked out the problem of utilizing their railways. When paying a visit to a German officer who filled an important position in a large fortress, I saw a table which looked like a kind of Bradshaw, and on asking what it was, I was told it was the annual mobilisation table. "See here," my friend said, "if we will 'have war, and to-morrow is the first day, I know that at four o'clock 'a train containing so and so will arrive, at half-past five another, and 'so on, for the nine days during which the operation of mobilisation 'takes place.'" And he told me that each year this table was altered, and every officer of certain grades had a copy of it. This table is really a very simple affair. An army is composed of men, horses, and stores; those men, horses, and stores, must in peace time be in certain known places. In war time they must be concentrated in other known places. Consequently it becomes a matter of simple calculation to determine where each of the scattered bodies or units can be best embarked in the railway waggons, and the time it will take to reach its point of destination. The table of mobilisation is merely the result of a careful study of the subject. In Germany, a section of the Head Quarter Staff, aided by the Government Inspectors of Railways, prepares these tables and prepares a Bradshaw, which in war takes the place, while the army is concentrating, of the ordinary Bradshaw; certain of the ordinary trains ceasing to be civil and becoming military, additional trains being added. On the completion of the mobilisation, the railway section simply directs what trains are to run as military trains, and all the rest work as usual.

Further, as every unit has its fixed head-quarters, so each army corps has its head quarters. And it is one of the functions of the railway section of the General Staff, aided by the Railway Inspectors to select for each corps what is termed a "route depot station"; to this station everything belonging to the corps is sent, whether going to it, or coming from it.

These route depot stations have each a commandant, they are selected after careful consideration, and if plenty of store and platform-accommodation does not exist, during peace it is made; at this station the commandant is supreme.

Further, in peace time a committee for each line, consisting of the traffic manager and a military officer, is appointed. The duties of this committee are the following :—In case a country is plunged into war there can be only a limited number of possible contingencies. These contingencies are determined carefully. The route depôt station, and the places to which the troops and stores are to be moved are also determined. The line committee determines, where halts have to be made, where men and horses are to be fed and watered, and on single lines the passing places for trains. These points are all clearly laid down, and every one knows them. The commandant at the depôt station simply loads the men, horses, and stores he receives from the district of the corps; the line committee take charge of them and deliver them at the transfer station. It is manifest that the whole of these arrangements require nothing more than a little care and forethought, and a mixture of railway knowledge and military knowledge on the part of those who make them. There is no science required at all. Let us suppose for one moment that Scotland was a foreign country with whom we were as likely to fight as we once were. And suppose we had 30,000 men stationed in Hampshire and Dorsetshire, 30,000 in the Midland counties, and 30,000 in Kent. The first step towards a mobilisation of these forces for a Scottish war would be the selection of points of concentration for each body of troops, the determination of a route, depôt station, a detail of how the men, horses, and stores should get to that station, and the selection of a line of railway over which each corps was to move, the appointment of a line committee, consisting of military officers and the traffic managers of each line affected, and the determination of certain fixed trains to be used for through traffic, and also certain places where men and horses might be fed, either breakfast, dinner, or tea, say six hours after starting. These conditions are clear and definite, and require only a little time to arrange. But where are these trains carrying all these men and stores to go to—where will you disembark your loads? Here we come to one of the most difficult problems to determine, and one on the correct determination of which much depends. Are the Scotch likely to be more advanced in their preparation for war than we are? What is the political state of the country? What is the character of the leader, is the war popular, have they many railways to concentrate their troops with? All these questions enter into the determination of this point. It is manifest that if the point of disembarkation is chosen too far to the front, the troops and stores coming up in a long column by rail are liable to be greatly inconvenienced, perhaps not by the actual attack so much as by the threatened attack of the enemy.

If the point is too much to the rear, the full value of the railways will not be obtained, consequently the determination of this point is one of the greatest importance. Let us suppose York is the station selected, then that station becomes the transfer station or collecting station.

Behind that, all transport is worked as described under the regulations prepared carefully beforehand, as much as possible peace-traffic is maintained, and after the first concentration of troops takes place, certain military trains only are run. The points of departure and the points of arrival once fixed, the concentration of troops becomes a simple matter.

Beyond York no civil traffic of any kind would be allowed, and a military railway director, with very extended powers, would be appointed to work all the railway traffic north of York, acting, however, always under the orders of the officer in chief command of the communications. But let us carry our arrangements a little further, the Collecting Station, York, becomes then at once a great store.

The troops as they arrive are pushed through it at once, some by rail, some by road, towards definite points, where each of the three corps coming from Kent, Hampshire, and the Midland counties would be formed. The station at York would be placed under a commandant, who would issue orders somewhat similar to the following :—

“No trains containing military stores are to pass York.”

“Trains with troops and ammunition may, unless specially ordered, pass.”

“No train will go to the front that is not full.”

“All provision trains will be unloaded, except in special cases, when definite instructions will be given.”

“All trains coming from the Army will run past York and *not stop* there.”

Meantime, let us suppose that the commissary-general of the army in front finds, or thinks he will find, difficulties in feeding the troops, on account of some flank movement that is going to be made against the Scotch Army. He notifies the commandant of the line of communications of the quantity of provisions he is likely to require suddenly. These are loaded up, formed into trains, and pushed into sidings a few miles north of York, with a small guard which encamps beside them; a telegram from the front brings them on at once.

Similarly an action is expected, and hospital trains are formed, placed in sidings, with nurses, medical comforts, and a guard; a telegram brings them to the front at once, and the sick or wounded are carried far past York to the south.

North of York the traffic would be entirely military, and worked under a military railway director, who would have under him a proper staff for the purpose, and who would arrange for all the traffic being worked in a regular way. But how far can such traffic be worked?

How close to the army can the railway transport be brought up to the front ? The answer to these questions depends on many things :—

- 1st. The line, is it destroyed or likely to be destroyed ?
- 2nd. The nature of the stations available as terminal stations.
- 3rd. The prospects of a collision with the enemy.
- 4th. The nature of the roads and the horse transport of the army corps.
- 5th. The situation of the army as regards the railway, and the front it was occupying.

But let us suppose a station selected, we will say Darlington, the enemy's army being somewhere in the neighbourhood of Newcastle. Beyond Darlington, railway transport would, except in special cases, cease, and each army corps would have to send its departmental transport to Darlington for supplies. Darlington, the route terminus, would be the point where the organisation of the line of communications would cease, it would be the great point where distribution would commence.

Let us suppose, however, a little further, that the railway has been destroyed north of Darlington, and that the enemy, the Scotch, retreat ; the army advances, and the distance from the route terminus to the corps becomes too great for the departmental transport to work. The officer in command of the communications foreseeing this, and knowing the direction the army is marching in fixes a fresh route-terminus and establishes a line of horse transport from the railway-terminus, Darlington, to the points he has selected, to these points the departmental transport now send for supplies, the transport of those supplies to the route-terminus, resting with the officer in charge of the communications, while a strong body of workmen would be put on the railway to repair it, relay the rails when the railway terminus would be again advanced and so on. At the Collecting Station, York, supplies would be sought, not only in the south, but in the whole region round York, and each commissariat officer of the army-corps would seek by requisitions purchased, or other means, to relieve the strain on the communication as much as possible.

Such I believe to be the principles on which the Germans work railways, and undoubtedly so far as we can judge by the application of cause and effect, they are correct. I have tried not to burden you with details, nor to enter into descriptions of how the complicated arrangements requisite for the organisation of lines, may be best divided between the departments of the army. If the principles are sound, the details will quickly settle themselves. But this we may feel sure of, that though good men may make bad systems work, yet all systems should provide for being worked by mediocre or indifferent men ; many

details of the German regulations, however, do not appear to me to be so framed,—I say it with the greatest diffidence and submission. But the general principles which pervade the whole, are logical, clear, and definite, and I cannot better conclude than by quoting the opening words of their new regulations on this subject.

“The regular working of railways is of the first importance, not only for warlike operations, but also as most materially affecting national interests. The greatest care should be taken that they are regularly worked ; on the lines in rear of transfer stations the ordinary traffic will not be interfered with for military purposes, except when absolutely requisite. As a rule the ordinary public trains will run, extra ones being added for military purposes. The carrying powers of a railway are best developed by constant steady traffic at regular intervals.”

“Any interference with the regularity of the railway is fatal.”

The CHAIRMAN : I trust I may be allowed, in the name of this meeting, to assure Colonel Home that the subject which he has treated to-night has been neither tedious nor uninteresting, and I hope I may be allowed to thank him in the name of those who have listened to his lecture, for the instruction which he has managed to convey in so interesting a manner. Genius has been defined as a “vast capacity for taking trouble ;” and although I do not think that is by any means a correct definition, there can be no doubt that success in any enterprise, or any line of life, depends on a vast capacity for taking trouble ; and I believe that the successes of the German armies in the two last wars were not so much owing to the manifestation of any great military genius on the part of the different generals, as to the vast capacity for taking trouble, which was displayed in the bureaux of the military officers of the empire in anticipation of war, no branch of which is probably, more important than that which Colonel Home has brought before us so ably to-night.

Colonel CHESNEY, R. E. : I should like to give one single illustration of the value of the system which Colonel Home has ably explained, of which I happen to have gathered the particulars on the spot, when visiting it on behalf of our Government at the close of the war. It occurred at a part of the siege of Metz that there were some comparatively slight but still smart actions, partly by reserve troops hurried up soon after a great part of the Army that had been round Metz, moved on towards Paris. Among these reserves were some from Wurtemberg. They came up not very long after the investment of Metz was complete, and almost immediately were brought into action ; some of them had only just arrived. I learnt that they came into action, were wounded, and were conveyed by railway to the hospital at Stuttgart, after a journey of less than twenty-four hours ; so that it was affirmed that they were actually only thirty-six hours from the time they came before the French until the time they found themselves again in the heart of Germany, lying in their own town hospital. I suppose there can scarcely be a more striking instance of the value of perfect railway-management in maintaining unbroken the communications of an Army with its base.

The CHAIRMAN : I am sure you will allow me to return your thanks to Colonel Home for his very valuable lecture.

PREFACE TO FIRST EDITION.

In the following Essay I have, as far as possible, studied brevity, and have purposely avoided repeated references to History : partly because I considered the object I had in view would best be carried out by arguing on general principles, partly because examples from the History of War can, like "figures," be adduced to prove anything. The present Essay is an expansion of a short paper I wrote on the subject in 1867, and which, though not published, was submitted to the Military Authorities. The notion of Mounted Infantry is of course hundreds of years old, and it is useless, therefore, my attempting to disclaim any pretensions of an important discovery. All that I have attempted is to put the matter before the public in the light in which it appears to me, and, in case the Military Authorities should ever decide to reform the organisation of the Mounted Branches of the service, to draw attention to what I believe is the groove in which the changes should run.

G. C. H.

[^{ms} SEROOR, 26th August, 1874.

PREFACE TO SECOND EDITION.

WHEN the Author issued the first edition of his pamphlet, his system of training a man to manage five horses was one, of which he had had no practical experience. He believed it to be feasible; but had not up to that time tested his ideas by personal experiment. The materials upon which he has since had to work consisted of stallions, all of them more or less disposed to fight, and many of them exceedingly vicious. It appeared to him that if he could successfully overcome the difficulty under such circumstances, and could train an ordinary Native Trooper to drive teams composed of such unruly animals, the feasibility of his ideas in the case of *pecially selected riders* and castrated horses would be placed beyond all doubt. Having, on the occasion of a Review of a Detachment of his Regiment trained on his principles, received expressions of approval from His Excellency Sir Charles Staveley and other distinguished Military Officers, he is induced to publish a second edition of his Pamphlet, in which he has elaborated more in detail his ideas relative to the employment of Mounted Infantry, both on the Field of Battle, and in the minor operations of war, and has, further, given a few hints as to the drilling of men and horses, suggested from an experience of 300 horses trained on his principles. His Pamphlet and his experiments with his horses have cost him many months' labour, which he will consider amply repaid, if he succeeds in turning the attention of the Military Authorities to an arm of the Service, not now recognized, but which, he thinks, is destined to play an important part at some future period in the History of War. In conclusion, he would wish to acknowledge the great obligation he is under to Major LaTouche, the Commandant of his Regiment, for the unreserved way in which he placed at his disposal the horses of the Regiment, without which he would have been unable to carry on his experiments on the scale he has now done.

G. C. H.

POONA, 9th September, 1875.

II.

MOUNTED INFANTRY:

AN ESSAY, BY CAPT. HOGG,

Cadre 2nd Bombay Cavalry and Adjutant Poona Horse.

The advantages of being able to place a body of men who can fight on foot suddenly on an enemy's flank, or of being able to detach them to seize with rapidity an important position, are obvious ; and there can be no conceivable objection to Mounted Infantry viewing it merely as an abstract idea. The question for discussion is, whether such a system of organization is practicable, and, if practicable, are there any disadvantages attending it which more than counterbalance the advantages and which render its adoption inexpedient ?

The question has been put before us in various aspects : some writers pointing out its special claims to attention in a country like India, where from the great mobility of Mounted Troops they are peculiarly adapted to meet the tactics of an enemy whose evasive style of warfare so frequently leads to a hasty retreat on the one side and a wearisome and too often ineffectual pursuit on the other : others recommend it to attention on account of its manifest utility in what are called the minor operations of warfare ; some writers have merely suggested that it is advisable to give our Cavalry more power on certain occasions to take care of itself ; and, lastly, it has been discussed as a new arm of the Service, not only independent of, but practically capable of superseding, the Infantry.

The various propositions which have been put forth have not as yet succeeded in making any practical impression on the heads of our Military Departments. Notwithstanding all that has been said in its favour, and the practical experiences of the American War, the fact remains that the feasibility of Mounted Infantry has not as yet presented itself in the same light to our Military Commanders as it has to the individual enthusiasts who have advocated its claims. It is certainly not a hopeful sign, after all the extensive war experience we have had lately, that a practical nation like the Germans, ever ready to improve their Military Establishments, should not have thought it necessary to turn serious attention to the subject ; and Boguslawski, in his "Tactical Deductions," says, that after the experience of 1870 he opposes the organization of Mounted Infantry, though he had previously supported it. In questions, however, of such great importance, and which involve such extensive changes, it is of course to be expected that the feeble efforts of a few individuals cannot at once produce any effect on the minds of those who naturally base their opinions on the experience of years, and those who advocate changes should not be discouraged because their

case may at the time appear hopeless. It will be sufficient for them to know that they have temporarily drawn attention to what they believe to be a necessary reform, and they must then remain satisfied to leave it to time to gradually bring forth the results which they would at once, and forcibly, drag into existence. Pleading guilty, therefore, to a charge of presumption for supporting views which have found so little favour with Officers of distinction and vast experience, I will proceed to the discussion of my subject.

It is absolutely necessary in the first place that we should clearly understand what it is we want. Is the offensive power of the Mounted Infantry to be limited to such occasions as they may happen to be fighting on foot with their comrades holding their dismounted horses? or are they also in their mounted formation to be capable of resisting attacks of Cavalry? Are they in their capacity as foot soldiers to be competent to take a prominent part in general engagements, or are their services to be limited to detached duties now undertaken by the Cavalry? In fact, are they to be generally useful, or are their services to be limited to a few special occasions, and are they to be able to protect themselves on all occasions, or must it be considered necessary to have a mounted escort to take care of them? All these are points which we should settle before proceeding any further in the discussion, as it would be idle arguing the question out until we thoroughly comprehend what it is we want. It will probably be admitted that it would be useless to adopt any system of organization for Mounted Riflemen that would only be useful on certain special occasions. For instance, suppose we kept up Mounted Establishments, as has been advocated by some, for our Infantry, as at present constituted, and mounted our foot soldiers as occasion required, such a system would, manifestly, have many objections; for the Infantry would only occasionally require the services of their beasts of burden, which at other times would be useless: thus involving great expense and extra strain on the Commissariat out of all proportion to services rendered. A similar objection would hold good to light carts, which could only be made use of provided the ground was favourable, or in fact to any system where there was no permanent bond of union between the men and their means of transport. Furthermore, any system of organization which involved the necessity of providing escorts must necessarily fail in commending itself to approbation. We have quite enough of encumbrances in the way of baggage and convoys which require protection, without being compelled to furnish escorts to helpless mounted soldiers; and we thus get so far in our discussion, that, whatever system of Mounted Infantry we introduce, one thing is quite apparent, and that is, that it must be, *a sine qua non* that it is not only useful under certain favourable conditions, which may or may not be forthcoming, but that it must also be able to take care of itself, if necessary, when attacked by the enemy's Cavalry. And, furthermore, that the

We must define exactly what it is we want.

Mounted Infantry must be self-supporting, and able to fight equally well mounted or dismounted.

organization should be such, that, if opportunities do not occur to enable a Commander to employ the Riflemen in a dismounted capacity, he may be able to utilise their services in other equally important duties in connection with the mounted branch of the service. In a word, the organization must be self-supporting and of universal application. If we can only get clear ideas so far, the discussion as to the various methods by which we can obtain what we want will be rendered easier and more simple.

The question of equitation being a most important one, it will be necessary to say a few words on the degree of proficiency required for the Mounted Rifleman, be he Infantry or Cavalry man. There are some who think that very little instruction in riding is necessary, and that all that is required is, that the foot soldier should ride well enough to avail himself of the services of his horse for being transported from one position to another. This, I take it, is a most dangerous doctrine. The *sine qua non* put forth by some advocates for Mounted Riflemen, that it is most important that in any system we may adopt the greatest care must be taken to prevent the Mounted Infantry man becoming a Cavalry soldier pure and simple, may be good, but it must be accepted with certain qualifications. So far as such a precaution may involve the introduction of a method of organization under which the neglect of the necessary Infantry training may be carefully guarded against, so far it holds good; but it is equally clear, that, whilst due regard must be had for the most perfect training as an Infantry soldier, the necessities of equitation must not be neglected. This is a point on which too much stress cannot be laid, and it is based on the fact of the absolute necessity of good proficiency in riding when a man has only one hand to manage his horse, and should be in a position to devote the other, as also his undivided attention to the destruction of his enemy. We have all had every-day experiences of the helplessness of a bad rider when mounted, and it would indeed be a dangerous experiment, and be playing at soldiers with a vengeance, to permit any system under which mounted men, who were indifferent riders, should be allowed to present themselves on the theatre of a battlefield. In these preliminary remarks I have endeavoured to establish two things: first, that, if Mounted Riflemen are to be a success, the men must be able to ride really well; and, secondly, that they must be self-supporting and available for a variety of duties. Making these two conditions my starting-point, it will next be necessary to ascertain whether we have any material available and, if so, whence it is forthcoming.

Mounted Infantry can be organized in three ways—first, by making use of the Infantry branch and as occasion
 Mounted Infantry can use of the Infantry branch and as occasion
 be raised in three ways. requires mounting them on horses or other
 beasts of burden to convey them to particular
 spots on the field of battle; secondly, by the Cavalry as now constituted, who can dismount and fight on foot when their services may be

so required ; and, lastly, by a special Corps of Mounted Riflemen organized and trained for the special purpose. In considering the comparative merits of these three systems, it will be necessary to keep in mind one point, which is an important element in the discussion, and that is the extra cost of any arrangement that may be proposed

Budget exigencies must be considered. with reference to Budget exigencies. Efficiency may be bought at too great a price, but, if we can combine efficiency with economy in expenditure, we shall start with a better chance of making our way.

The employment of the Infantry arm as now constituted involves of course, the necessity of adding equitation to the other duties in which instruction is at present given, and it likewise presents the problem of providing for horses to carry out that instruction. To meet this latter want recourse may either be had to the establishments now kept up for the mounted branches, or some scheme would have to be developed to provide the necessary beasts of burden. With regard to the former, taking into consideration the great disproportion in the numerical strength between the two branches of the service, it would appear to follow that in the large majority of stations such a system must fall through from want of means to carry it out. It is true that Infantry Regiments might in turn be sent to obtain a certain degree of proficiency in riding to stations where horses were available ; but then it must be remembered that, if our Infantry soldiers are to be taught to ride and manœuvre when mounted, it would not only be necessary to give them instruction as recruits, but a certain amount of annual training would likewise be required to keep them in practice. It is doubtful, therefore, whether the system of making use of Cavalry horses would be found to work well in practice, and, even if it could be carried out, there would still remain the necessity of providing horses in the field. The other alternative would be the keeping up of separate Mounted Establishments, but to such an arrangement there are objections. In the first place there is the objection of the expense, and that I think would prove fatal to it ; and, in the next place, the new establishments in men and horses that would have to be raised would increase the strain on the Control Department in the field ; and this, likewise, is an important defect. On the whole, therefore, there would be great difficulty in devising a scheme to turn the Infantry soldier into a Mounted Rifleman. He might no doubt as a provisional expedient be mounted on horses, mules, camels, or any other animals for service in this country on special occasions, such as the mutiny ; but it would be a hazardous experiment to make use of the Infantry man mounted on a horse in the presence of a scientific European enemy provided with efficient and well-drilled Cavalry, under dashing and enterprising Officers.

The next plan we have to discuss is the dismounting of the Dragoon
Second method considered. as contemplated by the Regulations. This plan would not add to the Army Estimates, but it is

open to the following objection. The Cavalry man under existing Regulations has not that special rifle training which is carried out in the Infantry, and which is so essentially necessary for men who are not naturally good shots; secondly, as at present constituted, sufficient time is not devoted to dismounted operations; and lastly, the average Cavalry man with his saddle packed in marching order is too heavy for service in a Corps of Mounted Riflemen, who should be essentially organized in the true spirit of Light Cavalry. The dismounted practice now in vogue should not of course be abolished, and Dragoons on foot might still, as on former occasions, be most useful to supplement the services of other troops fighting on foot; but, taking them as a body as at present constituted, to be converted wholesale into Mounted Riflemen, we should have disadvantages to contend with which might be got rid of by other and better arrangements.

If Infantry mounted on horses, and the Cavalry, as at present constituted, fighting on foot, do not furnish the necessary materials for the solution of the problem, it becomes necessary to turn to the third plan mentioned—viz., that of having special corps for the special service; and in raising these corps it will be necessary to bear in mind the special qualifications that are necessary for Mounted Riflemen, the combination of which would justify our forming Regiments to develop the idea of Mounted Infantry. Now, what are the special qualifications necessary for a beau ideal of a Mounted Rifleman?

They appear to me to be as follows:—Great proficiency in riding, first-class shooting, a light, active, and wiry frame, capabilities of marching on foot, and intelligence and individual resource; and the question is whence to obtain them? The system I would advocate is the drafting of men on the principle of selection from other Cavalry Regiments, making it a proviso that each man before he could be transferred should have served two years with a Cavalry Regiment, and should, in the opinion of the Officer Commanding, or of a mixed board of Officers, be a really good rider and otherwise possess the necessary qualifications. Such a system would ensure at the commencement two important and most necessary conditions—viz., that every man in the corps was, individually, a good rider; and secondly, that all the men had received sufficient training to enable them to manœuvre efficiently as a mounted body. This would leave the Commanding Officer, whilst keeping up by occasional practice the mounted portion of the Mounted Rifleman's drill, ample time to carry on and complete his instruction as an Infantry soldier.

In pointing out the Cavalry as the source to which we should look, I am, of course, referring to immediate wants: something in fact that will give us a start at once. With reference to the future it would perhaps be as well, whilst still feeding our Mounted Cavalry recommended for immediate wants; further arrangements would be necessary for the supply of ultimate requirements.

Rifles from the existing Corps of Dragoons, to look out for likely men in Infantry Regiments, in whose ranks there must be many capable of becoming good riders. Such men being selected by a system of volunteering, they should be attached to Cavalry Regiments for two years to learn their duties as Cavalry soldiers. At the expiration of that period they would, if considered fit, be transferred to the Mounted Rifle Corps, or, if they turned out bad riders, they would be remanded to their old Regiments. I have said previously that any scheme to recommend itself to the authorities must have, in addition to its other merits, the advantage of not burdening the Finances with heavy extra charges, and to fulfil this condition I would propose no present addition to the numerical strength of the mounted branch, and would suggest that the proposal should be carried out as

How the scheme should follow. Supposing that it was considered advisable to raise at once a small force of Mounted

Infantry, all that would be necessary would be to designate a certain portion of the Cavalry Regiments as at present Heavy or Light, as the case may be, and the remainder, which would be formed of drafts from the united body, would be called Mounted Infantry. There would be no reduction which would involve hardship on the Officers, no reduction or increase in the numerical strength of establishments. The only change would be that the light men would be congregated in particular Regiments, which for the future would be subject to a modified and special course of instruction. I have mentioned a small number, merely as a starting-point, but the numerical strength can be increased hereafter if subsequent conditions are favourable. Such appears to me to be the way in which we should set to work, if we wish to introduce a new arm of the service combining the capabilities of the present Mounted and Infantry branches of the service; but having got so far, we are still some

Changes in drill required. Difficulties of dismounted horses to be overcome. way from our goal: we may have found the direction of the road to it, but there are difficulties in the way which must be overcome before the goal itself is reached, and our endeavours must now be turned towards seeing if we can discover the best way of solving these difficulties. I have pointed out previously that the system now carried out in Cavalry Regiments is not adapted for the proper training of dismounted Riflemen, and it will be necessary for us, therefore, in the first place, to modify the system of drill to meet the requirements of the new arm; and having done that we must, if we can, overcome the still further difficulties of being able to make a large number of Mounted Riflemen from each Regiment available for fighting on foot, and also of knowing what to do with the riderless horses whilst the Riflemen are dismounted and engaged with the enemy. I shall first of all make a few remarks on the organization and drill.

The men, as I have said before, would be drafted from other corps,

Size of men. but they should be light weights and active, wiry men. The nature of their duty is essentially

that of the lightest Cavalry, and heavy weights would be out of place.

Much muscular power is not required; for, whilst acting as Infantry, the gauge of their fighting powers would depend on the accuracy of their shooting, and, when mounted, on the sharpness of their swords and their good horsemanship. A boy, if he is a good horseman and has a really sharp sword, could cut off the head of a giant. If any one doubts this, let him procure a curved sword and get a native *sickligur* to put an edge on it, and he can soon satisfy himself that when a sword won't cut it is the fault of the edge and shape. Light horsemen, moreover, have a great advantage in rapidity of movement and power of manœuvre.

The arrangements for the procuring of Remounts would remain as at present: good breeding, however, should be preferred to mere bone and substance. If Government would not object to the extra charge, it would be a great advantage to give extra money for the mounted Rifleman's horse as in the case of the Horse Artillery Trooper. The mounted Rifleman cannot be too well mounted: he should be so well mounted that nothing should be too bold for him. The men, whilst being able to deal their strokes with great rapidity, should at the same time have horses swift enough to elude pursuit if encountered by superior forces. No entire horses should be allowed.

Stable duties would have to be kept up as at present, so far as the morning stables are concerned. Evening stables also, if nothing else was going on, could be carried on as in Dragoon Regiments; but, if the men were required for dismounted drill at that time, no harm would accrue if the evening grooming was dispensed with, especially as it would not be of daily occurrence. It is doubtful whether our system of stables is not carried to excess. There appears to be no reason why one good grooming a day should not be sufficient for a horse, provided of course he was not required for work of an evening. This is an opinion that will probably meet with a good deal of dissent; but, after all, the question could be easily settled by a practical experiment. Under any circumstances the duration of evening stables might be reduced with advantage. To keep up syces would be very convenient, but it would entail extra expense, and the extra establishment would be a nuisance in the field.

The equipments, like the men, should be light, the saddle and bridle should not exceed 21 lbs. in weight. The valise should be abolished as a part of the horse's equipments and be carried elsewhere. The wallets and haversack should carry sufficient kit for marching order. Sheepskins, likewise, should be done away with: in fact, the equipment packed on the saddle should be reduced to the very lowest limit possible: every extra lb. tells with effect when thirteen stone has once been piled on a horse's back. I would add a standing martingale to the bridle appointments. The object of introducing it is, that the horse should be as much under control as possible. Martingales are, I am aware, strongly objected to by many Cavalry Officers, but I do not

recommend them without having strong grounds for doing so. The object of introducing them is, that the horse should be as much under control as possible, and there is no doubt that, if a horse has his head tied down, it gives the rider an immense power over him. It may be said a Cavalry man should be a sufficiently good rider to manage his horse without such assistance, but to be a good rider so far as having a firm seat, and being a good rider so far as it consists in having good hands and being able to manage a horse well, are by no means synonymous terms, and there is a great deal of difference between the riding of an accomplished horseman and that of an ordinary Trooper. Besides, even supposing for the sake of argument that every rider in a Cavalry Regiment was an accomplished horseman, that is no reason why he should not receive mechanical assistance for the management of his horse: he may get wounded or become exhausted, and surely, under any circumstances, it is advisable in the case of a fighting man to give him as absolute control as possible over his horse, for it not only increases his confidence, but it makes him more efficient in every way. Supposing a powerful Dragoon, because he happened to be powerful, could by the mere exercise of his physical power kill a man with a blunt sword, that would be no reason why he should not have the benefit of a sharp one, and the same argument seems to apply to the martingale. It has always been used by Oriental nations, who keenly appreciate the value of it. The principal objection to it is the cramping of the horse's action by the confinement of his head, but this is by no means the case if it is adjusted with judgment. It can of course, like many other good things, be pushed to excess, in which case it might be injurious. There is nothing whatever to prevent a horse having the full use of his powers with a martingale on, and they may be seen in the hunting field at home, and also occasionally in steeplechases. It has also this advantage, that when a man has to lead spare horses, which as we get further on in my scheme we shall see will form a prominent part of it, it renders the business much easier. The arrangements for lengthening or tightening it should be such that an adjustment of its length could be carried out without any delay. The bit, likewise, should be powerful, so that, in conjunction with the martingale, the rider might have his horse under thorough subjection.

The uniform would have to be altered slightly: a loose dress would be preferable: it would be more comfortable, and would have the advantage of permitting a man to accommodate the amount of his under-clothing to the state of the temperature. All belts should be black or brown, and pipe-clay should be reduced to a minimum. Pouches must be altered to hold an increased number of rounds of ammunition. Short boots and gaiters would have to be substituted for long boots; spurs should be shorter than at present, and fit into the heel with a box; leather scabbards should be substituted for steel ones, for they are lighter, keep the swords sharp, and make much less noise: they should be suspended from a frog in the swordbelt, which arrangement would

Clothing, arms, equipment, &c.

be more convenient for the men when dismounted; a light curved sabre too, should be substituted for the heavy straight one now in use. The rifle should be a short one, and a bayonet would not be required. With the present improved fire-arms they appear to be unnecessary, and a sharp sword would be found very effective at close quarters. According to Boguslawski, bayonets were never used in the War of 1870, except in the case of one or two petty engagements in woods and villages.

The Riding School, as it now exists, should be abolished. It has already been stipulated that no man should join the Mounted Rifle Corps unless he has proved himself a good rider during his probation with a Dragoon Regiment; such being the case, it would be a waste of time trotting him round the rides any longer. Once a good rider, always a good rider, so long as nerve and health last; and, having so many other important duties to perform, it would be unreasonable to keep up the Riding School as it now exists, merely for the sake of keeping up the ideal seat laid down in the Regulations. But equitation drill of another and far more important kind should be substituted. I stated in a former portion of this paper that one of the greatest difficulties in organizing Mounted Infantry was the question of the dismounted horses in action, and it is by an alteration in drill that I propose to get over this difficulty. Under existing arrangements the dismounted horses are always more or less at the mercy of a bold and enterprising Cavalry attack, unless accompanied by a strong escort, and even then if fired into by guns there would be no end of confusion amongst the led horses. I propose to obviate this by an alteration in the riding drill, and by devoting the time now wasted in keeping up a peculiar, and to many distasteful seat, to training the men to move with great facility and rapidity with dismounted horses. The men should be instructed to mount and dismount with great rapidity, even when the horse is in motion, and, further more, be trained up to the highest pitch of skill in the management of led horses. There is no doubt but that by constant practice and drill a body of men holding dismounted horses might be made highly mobile, instead of very much the reverse, as they are at present. With sufficient training and practice men can be trained to move with rapidity, not only leading one spare horse, but with *four*, the two led horses on each side being linked together, the sharp bits and martingales being of great assistance in the management of the led horses, as well as in the case of the mounted ones. I have further on entered more into detail on the subject, and will here only remark that such a system of training when carried out nearly doubles the fighting strength of the dismounted Riflemen. Under existing Regulations every other man in a Regiment is holding a comrade's horse, and thus few men are available for fighting on foot; whereas, if men and horses could be so trained that one man might manage four horses besides his own, a great element of strength would be gained, immensely increasing the value of a Mounted Rifle Corps.

The new style of training I have suggested would wonderfully decrease the difficulty of the dismounted horses; they could retire to the rear at a gallop if they found themselves under fire, and if surprised by Cavalry they could defy pursuit. The dismounted order should of course be not too close; each man should take care of his own led horses, retreat when necessary, come up again to the front at a gallop if necessary, and be in fact in every way as handy as Mounted Cavalry. I would have the men who held the led horses as light as possible, so as to elude pursuit if attacked in their non-fighting order: they might be styled the drivers, but they would of course go through exactly the same training as the others, and be available if necessary for fighting purposes. It is wonderful what horses can be trained to, and men likewise: what seems impracticable at first becomes as simple as possible when the necessary training and practice has been acquired. These, then, are the equitation drills which I would advocate in place of the Riding School, which I have recommended to be abolished, and I feel sure that for the peculiar nature of their service this is the system required for Mounted Riflemen.

Sword and carbine exercise should be reduced to a minimum, as they are only useful for show. More practice with single sticks might with advantage be substituted for the former. The rifle instruction, as ordered in the Musketry Regulations, should of course be carried out to the fullest extent as at present in the Infantry, and should be supplemented by a certain amount of practice on horseback. The corps should be able to manœuvre as a Cavalry Regiment, and take its place with other Cavalry Regiments on parade. Having been thoroughly drilled with this view during the time the men were in Dragoon Regiments, and the men being all good riders, a very little practice, say one parade a week, would be required to keep them up to the mark, in the mounted manœuvres. At least half of the time apportioned for parade duties should be devoted to dismounted practice, such as would be required by the men if acting against an enemy on foot; and to meet this want a few additions would have to be introduced into the Regulations for guidance as to the method of coming into action, and the manœuvres of the men as Light Infantry soldiers during such time as they might be dismounted.

Such then are the broad outlines of the scheme I would recommend for the formation of a Mounted Infantry Corps; and in tracing them I have endeavoured to suggest a method of organization which will produce a corps of really good riders, such as can be expected to take care of themselves if attacked by Cavalry in their mounted formation, and at the same time a body of men who having all received a careful musketry training, and having been especially drilled so as to be able to act in a

Greatly increased mobility of dismounted horses under new system of drill.

Sword and carbine exercise and rifle instruction.

Parades.

Cavalry and Infantry qualifications combined in the above system, and no extra expense to the State.

dismounted capacity, might be expected to produce a very considerable amount of effect during such times as they were acting as Infantry. I have further tried, by utilising materials which we have already in hand to devise a scheme which has at least one merit, and that is, that it will not burden the State with heavy extra charges. The difficulty of the dismounted horses will be got over by carrying out the modified system of equitation drill now recommended, and which has hitherto not been recognized in our Cavalry Regulations. If the ideas which have been put forth are not Utopian, but on the contrary practicable suggestions that could be carried out without delay by the mere issue of the requisite orders, then I venture to think that Government has now in hand the means of introducing a new weapon of offence, which would not only prove an immense source of power in this country, where rapidity of movement and the saving of the European is of so much importance, but further, the skeleton of an organization which, if fully developed, would prove of the greatest importance in European warfare. The position of Cavalry in war since the introduction of breech-loaders and improved rifled guns has changed very much, and it will not do, whilst other branches of the service are receiving the greatest attention to keep them up to the standard of modern requirements, to allow the Cavalry branch to

Other branches of the service keep moving ; the Cavalry must not stand still.

stand still, and to lose its comparative importance from the want of development of its latent resources. Recent campaigns have clearly shown the past services performed by the mounted branch in covering armies and gaining information of the enemy ; the old Napoleonic theory of keeping the Cavalry in reserve has been abandoned, and they are now sent freely to the front ; but who shall say that, in introducing this measure of reform to meet the tactical requirements of the age, all has been done that is necessary to render the mounted branch equal to the performance of all its capabilities ? The recognition of outpost and detached duties as specialities which should be performed by the Cavalry may be a reform in the right direction, but to stop so far and go no further is surely to take a short-sighted view of the case. To inundate the army by introducing wholesale a number of newly-raised Mounted Infantry Regiments may perhaps be a mistaken policy, from the simple fact that it would be impracticable. The material in men and horses would not be forthcoming, the addition to the Army Estimates would be overwhelming, the strain on the Control Department would be insupportable. But to make use of material which is already in hand, and a re-distribution and partial reorganization of which would be no burden on the finances of the State, in a word, to develop the efficiency of our existing troops to the highest pitch, this should be the policy of a wise Government. The contempt conveyed in the definition of a Dragoon being a soldier who fights indifferently on horseback or on foot, may perhaps have been justifiable when Dr. Johnson expounded the meaning of the term ; but the age in which that definition was written has gone by, a new age has succeeded, and surely such a definition should not be allowed to remain applicable to all eternity. The question of fighting on foot is one which depends on organization,

and there is every reason to believe that mounted soldiers can fight on foot if certain necessary conditions are forthcoming ; and these conditions can, I believe, be fulfilled by carrying out the suggestions which I have proposed. The system of selection from Dragoon Regiments will secure good riders, the increased musketry instruction will raise the standard of the shooting to that of the existing Infantry, the alteration in the equitation drill will get over the difficulties of the dismounted horses in action, and a modified system of tactical instruction will secure the requisite training as Light Infantry soldiers. The organization which has been recommended will, whilst thoroughly developing the value of the Mounted Infantry man as a Foot soldier, by no means do away with his value as a Cavalry trooper. There is no ground whatever for supposing that under the system proposed the value of the Mounted Rifleman's services as a Cavalry soldier should in any way deteriorate because changes have been made in his tactical instruction. Good horsemanship is the basis of good Cavalry organization, said the Confederate General FitzHugh Lee, when stating his views on certain questions which had been submitted to him for his opinion, and a truer word was never said. With good riding as a basis, two years' drill in a Cavalry Regiment, and occasional practice subsequently, there is no fear of the Mounted Rifleman losing his efficiency as a mounted soldier.

Having now indicated the source to which we should look in forming a nucleus for the introduction of the new organization recommended arm, it will be as well to discuss, whether, granting the practicability of the scheme be admitted, the adoption of it would be expedient. In other words let us inquire, even supposing we can congregate into special corps a picked body of men who can manage five horses at a gallop, are good shots, and possess the other necessary qualifications of Infantry soldiers, whether it would be advisable to do so, and whether the advantages to be derived from the employment of such a body of troops would be sufficiently great to justify the Government in making the experiment.

In order to obtain a satisfactory answer to these questions, it will be necessary to open up a discussion on the tactical value of the new arm, and if it can be shown that it is difficult to manage, and that the employment of it might lead to disaster, this would be a strong argument against it, even supposing the necessary material was forthcoming. In discussing the tactical uses of a body of Mounted Infantry raised on the principles recommended, it is proposed to consider the subject in two aspects. First, so far as their services could be utilised for the minor operations of war ; and secondly, for those larger combinations where the three arms unite for a combined operation. In discussing the question it will be necessary, whilst considering the various occasions during a campaign where Mounted Infantry would be an arm of tactical importance, to bear in mind also the possible elements of danger which might be apprehended from its employment, and then, balancing the advantages and disadvantages, let us impartially de-

Tactical value of the new arm must be discussed both as regards the minor operations of war, and combined movements on a large scale.

cide on which side the preponderance appears to lie. It has been stated that Mounted Infantry could be utilised either on a large scale, or for minor operations, and it is proposed in the first place to ascertain what, if any, tactical advantages could be derived from making use of it in the former capacity. Now in considering the matter in this aspect, it is as well to remember at the outset that it is not proposed for one instant that the services of the

Tactical advantages of Mounted Infantry when employed in large numbers on the field of battle discussed.

Regular Infantry are in any way to be superseded in consequence of the introduction of Mounted Riflemen. Each arm has a speciality of its own and there is no reason for the one in any way to interfere with the other. The Infantry always has been the arm on which special reliance has been placed, and so it will remain; but in these days of breech-loaders, when front attacks are attended with such fatal results, and when, in consequence, a diversion on an enemy's flank is of so much importance, it becomes a fair matter for speculation whether it is not advisable to make use of a highly mobile method of placing those who are to make the flank attack in the necessary position as rapidly and suddenly as possible. If a flank attack is slowly developed, as must more or less be the case with foot soldiers who have a long distance to march at very slow rates, two things must of necessity follow: first, the enemy has much more time to meet the movement by a fresh disposition of troops; and secondly, the Infantry will be more or less exhausted before they come into action; whereas if Mounted Infantry were made use of, the direction in which the attack was to be developed could be concealed till the last moment, and the movement then be made with such rapidity and suddenness that the chances of its success would be considerably increased, and the men who were to make the flank attack would arrive in position fresh and full of physical energy. In order to derive the full benefit of Mounted Infantry in large numbers on occasions such as we are alluding

to, it should necessarily be associated with other arms of the service. The greatest effects of tactical skill depend, usually, not so much on the individual power of any one arm, as on the combined action of all, each supporting and receiving assistance from the others, and it thus becomes apparent that, in making use of our Mounted Infantry, we must combine it with the other arms of the service, and as it is a highly mobile body, it should, necessarily, be associated with other equally mobile troops. It would follow, therefore, that in these turning movements it would be necessary to detach with the Mounted Infantry Cavalry proper, and Artillery, *not as an escort*, but as tactical units forming component portions of a combined force, the results of such combination being as advantageous in flank movements as on the front of the line of battle. How, then, would a combined operation of this sort be carried

out? We will take an ideal case, and suppose that an enemy in regulating the details of his march has committed some errors in the strategical disposition of his various corps, as a result of which one flank of his army will, for at all events some few hours, be deprived of its

proper proportion of troops. The General opposed to him perceives the weak point in his armour, and knows that a few, perhaps two or three hours, will repair the mistakes of his adversary, and that the opportunity for a decisive blow, if not taken advantage of at once, will be lost for ever. If he has at his disposal a force of Mounted Infantry, he could, without any delay, mass at the required point a large number of men trained and equipped for fighting on foot, who by taking advantage of the superior rate of speed of their horses could be placed in line in one-third of the time requisite for the Regular Infantry to reach the same spot, and being accompanied as they would be by Artillery and Cavalry proper, forces equally mobile with themselves, it is impossible to overestimate the influence they would exercise on the fortunes of the day. They would proceed either in column of troops or any other formation that might be suitable to the ground, just as if they were going to attack in a mounted capacity. That portion of the mounted Infantry who were to form the first line of Skirmishers would advance till they arrived just outside the zone of fire, when they would at once extend in small bodies of five men each five yards apart. Those who were to act on foot would dismount quickly from their horses, and hand them over to the drivers, who would at once gallop off to such a distance as *would render all chances of attack on the dismounted horses quite impossible*, the dismounted men dividing the intervals between the teams of horses. The supports would dismount 400 yards in rear of the Skirmishers, and their horses would likewise be taken away by the drivers. Whether they would extend or not, would of course depend on circumstances, but their horses in any case would be taken a considerable distance to the rear. Mounted scouts would connect them with the fighting portion of the Regiment, and patrol the exposed flank, so as to give timely notice of any attempt at attack from the enemy's Cavalry or Artillery. Should, through want of the proper precautions, such an attempt at attack ever take place, which is not likely if the horses are taken off a sufficient distance, the tactics of the drivers would be to retreat at speed, which their special training under the new equitation drill would permit them to do. The dismounted men having been trained to fight on foot being of course quite independent of their horses. If a larger force than could be supplied by the Mounted Infantry was required to act on the enemy's flank, it could be supplied by the Regular Infantry, who would march without undue hurry and take up a position in second line whilst the mounted Riflemen were carrying on the fight in advance. When and how the dismounted horses would join their riders would of course depend on circumstances, *but it should be a perfectly understood thing that the men when once dismounted should be able to fight without them*, and that the Officer in charge of the dismounted horses would make it his principal duty to see that their safety was in no way jeopardised by attacks from the enemy's Cavalry or Light Artillery.

Similarly in resisting the flank attacks of an enemy the services of Mounted Infantry would be found to be of equal importance. If a

sudden concentration of troops was required at one spot, what body of men so available, and in every way so suited to the purpose as Mounted Infantry ? They could mass five or six thousand men with the greatest rapidity on any threatened point of importance, and four-fifths of them being available as Infantry soldiers they could stem the torrent of the enemy's advance till the Regular Infantry had time to arrive at the scene of action ; and who shall gauge the value of such troops in crises where moments are of priceless advantage ? Not only do they give the Infantry time to arrive, but they permit of their coming up without hurry and confusion, and thus get rid of the fatigue and loss of breath caused by a long march at the double. It is of great importance for the Infantry to arrive at any threatened point fresh and in good wind, but it matters not in the case of the horses of the Mounted Infantry who can gallop at speed to the spot required, as all they have to do is to deposit their riders in a given position, and they are then taken away to the rear where they can recover their breath. Mounted Infantry would likewise be of immense value in cases where it might be considered necessary to deceive the enemy ; especially where it was required to make a feint on one point with the view of endeavouring to make the enemy concentrate in that direction, and then suddenly to develop the attack in another. In a word their sphere of action when employed in large numbers on the field of battle would be to assist the Infantry of the line by taking such portions of their duty as involved the greatest amount of physical labour in marching, and in which it was of the utmost importance to strike with rapidity. Their horses might be likened to a railway constructed round the lines of an army investing a beleagured fortress for the purpose of concentrating masses of troops at a given point at a moment's notice.

Let us now consider what would be the elements of danger in thus employing Mounted troops on a large scale on the field of battle. The weak points are generally supposed to be the led horses, the fear of the dismounted men being cut off and separated from their horses, and the weapon with which they would be armed not being sufficiently long to compete with the usual arm supplied to the Regular Infantry. Now with regard to the first objection there is no doubt that under a system in which the leading of dismounted horses is utterly neglected, where men are never taught to handle led horses, where the horses themselves are never drilled to go in hand, where dismounted work is looked upon as a bore, and only so much of it is practised as is necessary to avert the wrath of an Inspecting General ; I say that under such a system there is no doubt that the dismounted horses are a very weak point, and that an enemy with an enterprising Cavalry led by a dashing Officer would, if he could get within easy distance, render dismounted service under such circumstances exceedingly hazardous ; but the case presents a vastly different aspect when the leading of dismounted horses is looked upon as an art which can be taught by an organized and regularly practised system of drill, and

when a man can be instructed to manœuvre with five horses at a gallop so as to evade on an emergency any sudden attack of horsemen, when the usual precautionary measures for preventing such an attack may through carelessness or unforeseen circumstances have failed. Indeed, it is difficult to see how under a proper system anything that can be called a serious risk can be entertained; for when the Mounted Infantry are being used on a large scale, the dismounted horses are at once taken far away to the rear so as to render an attack by the enemy almost an impossibility, and in the minor operations of war, where the connection between the men and horses would necessarily be much closer, the new system of training men and horses would get rid of the immobility of the led horses caused by the want of such training under existing Regulations.

With regard to the dismounted men being 'cut off, this element of danger will speedily disappear if we can only realise to ourselves the effects of a system of drill under which the men will have been trained to act in every way exactly the same as Infantry soldiers. Under such a system they no longer feel themselves helpless when separated from their horses; though Cavalry soldiers in every sense of the word, they have, nevertheless, under a special system of drill, been taught to manœuvre and shoot just like their comrades in the line, and, when forced to retire before superior numbers, they would do exactly the same way as the Regular Infantry; they would by no means look upon it as a catastrophe, likely to lead to disastrous consequences, merely because their horses were perhaps a mile off or more in the rear. On the contrary, their whole training would have taught them that, when used in large numbers on the field of battle, the necessary consequence of such employment would be to sever them from their horses, who would probably be taken many hundreds of yards to the rear, for the double purpose of avoiding an attack, and of getting out of the way of any other troops that might be coming up in second line from the rear. Men who during the time of peace had been merely trained to do a little dismounted work occasionally on a small scale, and had been always taught to look to their horses as a means of flight when attacked by superior numbers, would naturally be demoralised if employed on a large scale and separated from their horses, but under the principles advocated they would have received a complete and regular training as infantry soldiers, and they would in consequence, when severed from their horses, feel as much confidence in their own powers as their brethren of the line.

With regard to the question of the comparative merits of the long and short rifles, the Author is aware that he labours under the disadvantage of not having made the subject of fire-arms a special study, but he may be permitted to remark that even supposing we admit, as we must do, the superiority of the long rifle at long ranges, still there is no doubt that short rifles can be made which are possessed of very considerable

powers of shooting at long distances, and that it is not too much to expect that, if once the subject of Mounted Infantry was taken up with enthusiasm, the skill and the talent now employed throughout the country in the manufacture of fire-arms would soon develop an arm which would very considerably lessen the objection now urged with reference to the short rifle which it would be necessary to use for the new branch of the service.

There are one or two other objections which may probably be raised to the system here advocated, and which, though they are quite as applicable to the minor operations of war as to large combined movements, it will be as well to allude to in this place. The objections I am referring to are in connection with the led horses in the teams of fives. In criticising my scheme the objection will probably be raised by

What would the driver of a team do if one of his horses was shot or tumbled down?

those who disapprove of it, "what would the driver do if one of his horses was shot, or if one of them tumbled down?" To the first question I reply as follows: that under proper arrangements the dismounted horses would never

be under fire at all, or at all events such cases would be rare. It is quite possible that under existing Regulations where even one dismounted horse is, comparatively speaking, immobile, the dismounted horses might be subject to fire, especially Artillery fire at long ranges where the country was very open; but, when dismounted horses are as mobile in the hands of their drivers as a mounted troop or squadron, there does not appear to be any reason why the dismounted horses should ever be under fire, unless willfully placed there by the Officer in charge of them. However, admitting that such a thing must occur sometimes as one of the driver's horses being shot, what it may be asked would an Artillery man do if one of the wheel horses were shot? a much more likely contingency. The gunner would probably say get him out the best way you can and this is the only reply I can give; but, in giving it I may be permitted to point out that, whereas in the one case the getting out of the horse would give some little trouble, in the other the driver would get rid of his dead horse with comparative ease. He would let go the dead horse's reins, and one of the whippers-in* would with a knife at one stroke sever the leathern link fastening the horse to his next-door neighbour. There is one feature in this question of killed and wounded horses which does not appear to be sufficiently considered by those who puzzle themselves over the reply. It does not follow that because a horse is hit with one, two, or even more bullets that therefore he must necessarily tumble down. Those who have had any experience in field sports will recollect the wonderful tenacity of life exhibited by animals after they are wounded by rifle balls, provided the part struck does not happen to be a vital one. Small deer, not much bigger than dogs, will after having one of their fore or hind legs smashed to atoms,

* The whippers-in here referred to are alluded to further on. They have no horses to manage but the one they are riding.

or with their abdominal contents hanging out in large masses, often gallop for miles. Similar experiences will present themselves to those who have indulged much in the sport of hog-hunting. With regard to one of the horses in the team tumbling down, it can only be said he must get up again the best way he can. No danger to the driver need be necessarily apprehended. The writer has had three or four cases of horses tumbling down with him when he has been driving a team with no evil results whatever, and without in any way inconveniencing himself or his other horses. They have generally occurred in the case of timid horses in the first stage of their education, shying away from the whip and crossing their legs and tumbling. Horses that have once been thoroughly drilled to go in fives seldom make any mistake, but, even if they do, they find no difficulty in getting on to their legs again. It may perhaps be thought that if the driver himself was shot this at all

Supposing the driver himself was shot ? events will be an awkward predicament, and one not easy to deal with, but as a matter of fact it will be found that when five horses which are linked together get loose, there is seldom any trouble in dealing with them; they scarcely ever all want to go in the same direction, and the very fact of their pulling in different directions enables them to be caught almost at once. In each case, therefore, it would be the duty of one of the whippers-in to take the place of the driver that had been shot, handing over his own horse either to a serrefile or to another whipper-in. Such cases would, however, under a system by which the led horses were scarcely ever exposed to fire be very rare.

There is another question that will probably be raised, and it may perhaps be urged that although it must be admitted that one man can on a parade-ground manage five horses at a gallop, yet, notwithstanding this, on a battle field there would be a serious risk of the dismounted teams becoming unmanageable under the influence of fear arising from the deafening din of musketry and artillery. I can only again repeat that, with the dismounted horses well in rear, this risk would be reduced to a minimum, even if it ever existed at all, which is very doubtful. A good deal of misapprehension sometimes exists as to the question of horses standing fire. With the exception of very timid horses, which are *always* out of place for war purposes, it will generally be found that the steadiness of Cavalry horses under fire depends very much on their condition, and the amount of work they have been doing. Leave a Cavalry Regiment at its Pickets for a week in a cool and invigorating climate and with plenty of good forage, and then take it to Ball Practice without giving it any work in the meantime, and see how many hits and how many misses there will be. March the same Regiment a couple of hundred miles to a Camp of Exercise, and let it be bucketed about for a few days by Brigadiers and Generals, and then see how many horses are unsteady even when Artillery and Infantry are blazing away all around them.

There is another thing which Cavalry Officers will also have observed with reference to horses unsteady under fire, and that is, they are much less frightened when standing together than when apart from each other in skirmishing order. One of the best ways of making an unsteady horse quiet under fire is to link him between two quiet horses whilst the firing is going on. If anything will cure him that will. To revert however, to the question of the teams becoming unmanageable, it can only be said that it is not very likely that horses, hard worked as they would be on service, would give much trouble, and that with the system of linking all the horses together it would be quite impossible for a fractious horse to get away unless the tackle broke. Each horse, moreover, during the time he was receiving his education would become well known to the drivers, who can increase their power over them by shortening the martingale if they find they are troublesome.

Having now discussed the method of making use of Mounted Infantry in large numbers to produce a decisive effect on the field of battle, it is proposed to allude briefly to those occasions where their services would be utilised for a different purpose, where they would be called upon to act in small numbers, and be detached perhaps far away from the army to which they belong. Using them in this way there appears to be no single sphere in the minor operations of war where their services would not be of the highest importance. Utilising them as the Germans did their Cavalry in the late war, they would possess all the qualifications of the ordinary Cavalry soldier, with this in addition, that having received tactical training as Infantry soldiers, and being organized on principles which permitted the fullest development of such training, they would be capable of performing services which a Dragoon Regiment organized as at present could not attempt. The want of the fighting power of their Cavalry on foot was felt by the Germans in the late campaign. Boguslawski tells us that they frequently found it necessary to attach Infantry to their Cavalry to hold small posts, or to enable it to cross certain tracts of country. To chain Cavalry to Infantry, however, is to compel the former to regulate its movements by the marching capabilities of the latter, and on detached duties which involved considerable marching powers, and when time was of importance, it would appear to be a great advantage to possess a body of men combining the speed of the Cavalry branch with the fighting capabilities of the Infantry soldier. The opportunities for making use of Mounted Infantry in what are called the minor operations of war are in fact so numerous that it is not proposed to enter minutely into all of them. Three or four ideal cases will be given, and they will serve as illustrations for the remainder. In Advanced Guards the employment of mounted men trained on the above principles would frequently be found of great service, and would prevent the necessity of harassing the Regular Infantry on every occasion when the services of foot soldiers were required. If a wood

Use of Mounted Infantry in the minor operations of war.

Mounted Infantry as Advanced Guards.

or otherwise enclosed or rough piece of country presented itself in the front or flank of the line of march, from whence it was necessary to dislodge bodies of the enemy who had taken up a position therein, how easy it would be to make use of a body of men who had been trained to manœuvre with five horses at a gallop, and what a saving of labour it would be to the Regular Infantry whose physical resources, if relieved of harassing duties of this nature, might be kept in reserve till the last moment when the actual line of battle was formed. Let us suppose that a piece of ground capable of concealing a body of the enemy presents itself close on the flank of the road on which the army has to march, and that the Officer Commanding the Advanced Guard of the Mounted Infantry in front receives intimation that it is occupied by a small body of the enemy, he would immediately form his Advanced Guard into a line of Skirmishers, dismount four out of five, and the drivers would at once gallop off with their teams whilst the dismounted men would pass through the ground to be cleared in Skirmishing order on foot. If the broken ground reported to be occupied by the enemy was too extensive to be properly searched by the Advanced Guard, or if for any other reason a thicker line of Skirmishers was required, the officer Commanding would send intimation to that effect to the officer Commanding the main body of the Mounted Infantry Advanced Guard, who would at once detach one, two, or more Squadrons temporarily to his assistance. All the horses would be taken to the rear so as to be quite clear of the line of fire, and they would not be permitted to join their riders in front till the latter had reported the coast was clear.

Again, let us take the case of a Squadron on Piquet duty whose videttes have been driven in by the enemy. Under existing circumstances when the outposts are furnished by the mounted branch, the Piquet and support can do but little, if the enemy, though but small in numbers, have any Infantry to bring against them. If, however, the Piquet and its support were to form a line of dismounted men on a previously selected position on receiving information of the enemy's attack, a very considerable resistance might be afforded to the enemy's approach in cases where the ground was favourable. If driven in they would get on their horses and gallop off till they arrived at another position which from the features of the ground was equally adapted to their making a resistance, and they could then again dismount and open fire till they were again forced to retire, and by so delaying the advance of an enemy by alternately fighting on foot and retreating on horseback, they could give time to the Officer Commanding the main body of the outposts to make his dispositions.

Let us now take an ideal case of a Regiment detached some distance from the Corps to which it belongs, and which, even if it is considered an improbable one, will sufficiently illustrate the working of the principles advocated. Most men will admit that the

Ideal case of a Mounted Infantry Corps detached to seize a position of importance.

greatest danger to dismounted horses arises from a sudden and rapid attack of Cavalry. They need clearly be under no risk of attack from Infantry or Artillery, for their mobility alone when properly trained renders them quite safe from such attacks, even supposing they had no escort to take care of them. We will suppose, therefore, that a Regiment consisting of four Squadrons mustering 600 sabres, is detached to the front for the purpose of seizing some position of great importance, and that the Officer Commanding it has received instructions not to retire except under overwhelming circumstances. Let us suppose also, that the ground on the way to it is perfectly flat and in all directions favourable for the enemy's Cavalry to act in a mounted capacity. We will further suppose that it is of equal importance for the enemy to seize this position, and that he detaches a Cavalry Regiment by forced marches for the purpose of getting between the enemy and the position, with instructions to the Officer Commanding it to detain them till the Infantry can arrive from the rear. Now under ordinary circumstances there would be nothing for it but for the two Regiments to fight it out mounted, in which case our Mounted Infantry Corps might or might not get the best of it. But, under any circumstances, victory could only be gained, supposing the material to be tolerably equal on both sides, by the loss of a good many men and horses which would considerably weaken the effective strength of the victorious Regiment. In place, however, of doing anything of this kind, the Officer Commanding our Mounted Infantry Corps would probably act very much as follows. Dismounting one Squadron he would throw 120 men into a line of Skirmishers, and with his front thus protected he would still continue his march with his remaining Squadrons and dismounted horses a short distance in the rear. Now, unless modern ideas on the effect of Breech-loading fire are all wrong, any attempt on the part of the Mounted Regiment to attack these Skirmishers in front would lead to useless slaughter, and the enemy would probably try the effect of a flank, or perhaps two flank attacks. Let us suppose he adopts the latter, that he leaves two Squadrons still opposed to, though beyond the range of fire of the Skirmishers, and that he launches his other two Squadrons with directions to get at the flanks or rear. Such a proceeding manifestly subjects him to the double and serious disadvantage of dividing his forces, and consequently his command, and at the same time gives the Officer Commanding the Mounted Infantry Corps the advantages of a central position from which with his men united he can, if he wishes it, move offensively on interior lines. However, under the desperate circumstances of the case we will suppose the Cavalry Officer is justified and that he carries out the idea. How does the Officer Commanding the Mounted Infantry meet the movement? By detaching mounted men against those who wish to make the flank attack? Certainly not; he wheels a troop mounted to the Right and Left, and whilst the enemy are making their circular march beyond the range of fire to get at the flanks, he places 60 men dismounted on each flank, and as 120 men in front would probably no longer be required, he would

most likely relieve the half of them by ordering them to retire to their dismounted horses, and the result of these tactics would be, that the Officer Commanding the Mounted Infantry Corps would still have five mounted troops in a central position, and 180 men with Breech-loaders divided into three parties on his front and to both flanks. The Cavalry Regiment, therefore, would be no better off than it was at first; indeed, it would be under the serious disadvantage of detached and disunited troops and the horses would have had so much work for nothing. The only opening left would be the rear, and it would not prevent any more practicable results than the attacks on the flanks, for one of the mounted troops could easily be placed in a position to meet the attempt. All this time the Mounted Infantry Corps would still be continuing its march, and when the Officer Commanding it had allowed the Cavalry Regiment to expend its energy and strength on his impenetrable armour for some time, he might from his central position, whenever he thought it expedient, launch his fresh mounted Squadrons on his disunited and tired out enemy. Acting on principles of this kind, there can be no doubt that not only would a Mounted Infantry Regiment be able effectively to resist any opposition from equal numbers, without in any way wearing out their horses and men, but that a Mounted Infantry Corps acting thus might safely march in the presence of a Cavalry force half if not double as strong again. What in our ideal case would be the effect of two or three guns acting in combination with the enemy's Cavalry? Even under such circumstances the advance of the Mounted Infantry Corps would by no means be necessarily arrested, nor would its dismounted horses be a source of danger; for even supposing it had no Artillery of its own, which is supposing an inequality that would probably not exist, Cavalry being more mobile than Artillery, the guns might safely be left to be dealt with by three troops of the Mounted Infantry, who by continually moving on the flanks and rear of the guns would, by dismounting the men and subjecting the gunners to an Infantry fire, compel them to keep continually limbering up. It may perhaps be urged that the Cavalry could dismount and fight on foot in the same way as the Mounted Infantry; but it must be recollected that their horses not having been trained to lead in hand at a fast gallop would not be mobile, and further that they would only have 300 Infantry men to oppose to 480; an inequality which would soon make itself felt if matters resolved themselves into an Infantry engagement.

As escorts to Field Batteries in detached or otherwise exposed situations, Mounted Infantry would be found far better than either Cavalry proper or Infantry.

Mounted Infantry as
Battery escorts.

If Infantry are attached to guns, they necessarily hamper anything like a rapid movement involving an extensive change of position. If Cavalry proper form the escort, their fighting powers on foot would be so limited that except in cases of large escorts it would be of little use; whereas, if the escort consisted of mounted men trained on principles which admitted of their acting in the double

capacity of Cavalry and Infantry soldiers, they would not only be a mere escort, but a tactical unit capable of acting in combination with the guns. In the case of Horse Artillery it would be well worth while for Government to consider, whether it would not be a good plan to increase the Mounted Establishment, so that the men composing it should when trained to act on foot as well as on horseback be always in a position to completely support and protect their own guns, thus rendering them quite independent of any Cavalry or Infantry escorts. It is useless, however, to enter into details regarding all the various occasions on which Mounted Infantry would be an arm of importance, the principles on which they would act being the same in all cases; viz., to dismount and make use of their power derived from their Infantry fire. In anticipating an enemy at a defile, in defending it on retreat, in attacking convoys, in imperilling the communications of an enemy, in advance and rear Guards and Flank Patrols, on Piquet duty, as escorts to Batteries, these are some of the occasions on which they might be used with advantage in the minor operations of war; whilst in operations on a large scale involving the combined action of the three arms, they will be found of equal value for making a flank attack, and in bringing up men rapidly to a decisive point of a line of battle; and, finally, when dismounted duties are no longer required of them their services will still be available for charging the broken ranks of a defeated enemy.

It does not appear, therefore, that there is any reason why Mounted Infantry, if organized on proper principles, should not exercise a very considerable influence on the field of battle, not only by their fire, but also indirectly by sparing the Infantry the excessive fatigue caused by long flank marches; nor is it probable that there is any chance of disaster if they are employed in the manner recommended. Their training as Infantry soldiers is perfect, and there need therefore be no cause of alarm if circumstances prevented their remounting their horses at a moment's notice. Their own fire is a very sufficient protection, and it is supplemented, moreover, by that of the Batteries which accompany them; and furthermore, as they are acting in concert with Cavalry proper, there need be no apprehensions from the enemy's Cavalry. Under the system now in force under which half a Regiment is required to hold the horses of the other half, and a still further reduction is made in the number of men available for dismounted duty in order to form an escort, no doubt the fire of a Mounted Rifle Regiment would be too trivial to be of much importance. Sir H. Havelock in his book, page 62, contemplates only seventy men in line out of each Regiment, and such a strength would certainly be of little use; but if, under the system proposed, men and horses could be so drilled as to enable four men out of five to be available for Infantry purposes, each Regiment of 500 strong could put 400 men into action, and thus in the case of, say, six Regiments would represent a very powerful force taken into consideration with the Cavalry and Artillery

with them. Besides being available on the field of battle for dismounted fighting as above discussed, the Mounted Riflemen would likewise, if so required, be in every way fully capable of taking their place with the Cavalry to take part in any offensive movement that might be made by the mounted branch. Being well mounted and efficiently drilled as Cavalry soldiers their services in a mounted capacity would be fully equal to those of their brethren in Dragoon Regiments, and they would, moreover, from being essentially organized on the true Light Cavalry principle, be of special value in all cases, where it was deemed necessary to pursue and harass a retreating enemy.

If the views put forth are correct, then there can surely be no reason why the notion of organizing Mounted
 Conclusion. Infantry should not only be good as an abstract idea, but a practical one capable of being worked out, and carrying with it an improved organization in the mounted branch of the service. Furthermore, it would appear that in introducing it, so far from doing anything that is inexpedient, or likely to produce an element of danger in our tactical combinations, we shall on the contrary secure a powerful weapon of offence, and in all operations that require swiftness of execution lighten the physical exertions of our Regular Infantry. We shall have an arm of the service which will place at the disposal of the Commanding General a body of troops which in addition to the special duties of the Cavalry branch, are as ready, equally, to carry out a *coup de main* as to resist a sudden and unexpected attack of the enemy; and this arm, so far from in any way interfering with the action of the Regular Infantry, works with it, acting as it were, on such occasions as it is associated with Infantry, as its advanced guard, and giving it time to come into action. Mobility always has been, and always will be, an essential element in all tactical changes, and as time is now, more than ever, of infinite importance, there is no reason to doubt that as years roll on the value of mobility will become of even more importance than it is at present. Straining to their utmost every nerve to secure the advantages of rapidity of movement, the extended use of mounted troops will inevitably present itself to the minds of rival combatants, the value of the mounted branch will be ever on the increase, and Cavalry combats will become more frequent than they are now. But the tactics of the coming age will assuredly differ from the days when Murat's Cavalry were hurled *en masse* on the enemy on the Field of Eylau. The old Cavalry tactics may not entirely disappear, the mounted branch may still be available, as in days of yore, for the destruction of shattered Infantry and the pursuit of flying troops; but fresh opportunities for distinction will arise, new spheres of action will be opened up, and the importance of Mounted Infantry, in the true sense of the word, will eventually be realized. It is time we should shake ourselves free from the traditions of past generations, and that this important question should receive the consideration it deserves. Shall England, possessed of the greatest wealth, the best horses, and the boldest riders, slumber, or shall it realise coming events and be wise in time?

PART SECOND.

SECTION I.

THE management of five horses is an art which presents far greater difficulties in theory than in practice. The unknown always inspires terror, and the novice in the art of leading dismounted horses thinks it a very difficult matter, like the boy learning to swim; merely because he has not personally ascertained how easy the process is. There is no real difficulty in the matter, nor is there any necessity whatever for great skill in horsemanship to ensure perfect success. The grand secret in this, as in many other things, is self-confidence. When once that has been attained, a moderate amount of training of man and horse will enable the trooper to manage his team of five horses safely and effectively. Great pains should be taken in the early lessons which should on no account be hurried over; for it is on this period of the training that future proficiency so much depends. If a novice is hurried and made to manage three or four led horses before he can properly control one, he will probably be continually having the reins snatched out of his hands, or perhaps he may find himself dragged out of the saddle, merely from the want of knowledge of the correct method of dealing with his team in some awkward or perhaps difficult contingency. In either case failure has a bad effect; for a fall might act injuriously on the nerves of a not over-confident rider, and, on the other hand, horses that are continually getting the upper hand of their drivers are apt to think they are not under their control. The instructor, therefore, should be most careful that his teaching should be progressive and adapted to the capabilities of his pupil, and he should do all in his power in the early stages to produce that confidence on the part of the rider, which enables him to deal with any emergency as it arises, and at the same time demonstrates to the horses that they are completely under control. This desired result can best be obtained by dwelling at length on the periods of instruction embracing the first and second lessons, a careful training during which will secure that proficiency of skill and confidence on the part of the rider, and submission on the part of the horses, that render the later period of instruction comparatively easy. If a man has perfect control over three horses, it may be anticipated with confidence that he will have no difficulty with five; whereas, on the other hand, if he attempts to handle the larger number before he is thoroughly competent to manage a single led horse and a pair, he will inevitably meet with disappointment, and have again to go over the old ground over which he travelled too quickly at first. If trained horses are available, it will of course be as well to make use of them with beginners, for although no difficulty need be anticipated in the case of untrained ones, still there is no object to be gained by neglecting to make the drill as easy as possible for beginners. When once the horses of a Regiment have been thoroughly trained to go in hand, it will be found that like horses broken into harness they will

never forget what they have been taught. It would be as well, however at such time as the Regiment is not doing any dismounted work on parade to send the horses out occasionally to walking exercise with each driver leading his team of five horses. Such a system would, moreover, have the advantage of economising the labour of the men.

Before concluding these preliminary remarks, it is as well to state that in the case of a Regiment which is about to be put through the new system of drill for the first time, it would be advisable to pick out the three best riders per troop, and to allow them to be thoroughly trained before the Regiment is put through in a body. The advantages of such an arrangement are obvious. All the men of a Cavalry Regiment are not necessarily good riders, nor are all the horses steady. At first some of the former will as a matter of course be timid, and some of the latter will be equally sure to be awkward, and perhaps show vice. In such a case it will be of the greatest advantage to have a small band of trained men to meet all cases of emergency. Suppose a bad tempered horse is giving trouble, and a soldier new to the work, and only an indifferent rider, is unable to manage him, the instructor directs him to fall out, and putting up one of his trained rough riders, the awkward horse is at once reduced to submission by a skilled horseman especially trained for the management of awkward or vicious horses. The result of such a system is that the timid trooper will gain confidence, and by watching a better rider than himself in dealing with emergencies as they arise, he will pick up many useful hints for future guidance for himself. All awkward and vicious horses should at once be put aside and dealt with in this manner, and it will generally be found that one or two lessons with a really good man up will render the horses submissive and obedient to their own riders. With these preliminary remarks I now pass on to the practical portion of my subject.

The training of the horses and men may be divided conveniently into two parts. The first embracing such portions of the drill as will take place in the Riding School or Manege; the second the more extended lessons given in the field. A period of four months will amply suffice for the instruction to be included in both periods. In the case of really good riders, and ordinarily quiet horses, half that period would probably suffice, but I have fixed on the more extended period as one calculated to meet all contingencies.

It will be as well in this place to say a few words regarding the **Martingales and Links.** tackle which, it is recommended, should be added to the existing equipments. It was suggested in the former edition of this Pamphlet that martingales and links should be introduced in order to give increased control over the horses, and an experience since of 300 horses trained on the principles advocated has not modified the opinion then expressed by the Author;

not that it is not possible to manage a team of five horses without such mechanical assistance, but because with such assistance the process is easy, and a loose horse impossible without the tackle giving way; whereas, without it, unsteady horses would be extremely difficult to manage, and would constantly be breaking loose. The exact form of martingale and link is a matter of detail which will probably be best settled by professional saddlers accustomed to the manufacture of such articles; but I will briefly allude to one of many patterns which I have myself tried, and which, at all events, has the merit of altering the existing equipment as little as possible. The martingale is fastened on to the existing breast-plate, and consists merely of a stout piece of leather firmly sewn into the breast-plate at its broad part where the rosetts is fastened on; the other end when in use is passed through the lower ring at the back of the head stall, and being doubled back is secured to the required length by a buckle attached to the martingale about 8 inches from its point of insertion into the breast-plate. The link is made of a stout piece of leather, one end of which is fastened with a loop and buckle to the lower ring at the back of the head stall, and the other in the same way round the upper part of the head stall behind the horse's off ear. The length of the link should be 21 inches. Each driver should have a spare one in case of accidents. When the caution for dismounted work is given, the end of the link which will be made fast to the bit of the led horse should be undone and allowed to dangle until the dismounted practice is all over; the loose end of the link can then be made fast to its proper place. In comparing the advantages of leather and steel links, there is a good deal to be said on both sides: leather links have the advantage of being light, and consequently less liable to irritate a horse's mouth, and if a horse is shot, they can with one stroke of a sharp knife be at once severed in two to disengage the dead horse. Steel links would, however, be stronger, but until some contrivance can be hit on by which in case of a dead horse they could be quickly undone, leather would be preferable. It would be an improvement to the leather links to have steel swivels instead of loops and buckles at the ends, as the linking and unlinking process would be so much quicker.

For the instruction to be given in the Manege, the Regulations in the Cavalry Drill Book relative to the Single Ride appear to meet all the requirements of the case. The Bending Lesson should, however, be omitted, and the "circle right and left," "circle and change," and "circle entire," would scarcely be required. Squareness of turn should not be insisted on. Distances from head to croup would have to be increased according to the number of horses in the team, so as to give plenty of room for the teams.

This should be with two horses—that is to say, one in addition to the horse the man is riding. The two horses are linked together by fastening one end of the

First Lesson.

link to the lower ring of the head stall of the mounted horse, and the other to the bar of the bit of the led horse. The curb rein is passed over the led horse's head, the mounted man grasping it with the third and fourth fingers of the right hand between the reins.* This is a most important lesson; in fact, it may be said the horse receives the principal part of his education in it. It is very necessary that at this stage of the proceedings he should be thoroughly accustomed to the sight of the whip, and that the driver should be taught how, when necessary, he can make use of it to the

Uses of the Whip. Some horses, at first, when led by a mounted man with a whip in his hand, will when they see it raised, hang back from it, and get so frightened that were it not for the link they would constantly break loose from an inexperienced driver; and, yet in most cases nothing is easier than to overcome this terror of the whip, and when once that has been done, it will be found to possess many most important advantages. It will be observed, as the reader proceeds, that I have further on suggested the advisability of two whippers-in per troop to assist the men with horses that are inclined to jib, but this should not in any way dispense with the necessity of each man being able to manage his own team without such assistance; for there may be cases with small detachments where such assistance cannot be obtained, and where the drivers will be entirely dependent on their own resources, and in such cases the skilful use of the whip is absolutely necessary. It is worth while, therefore, taking a little trouble in the matter. After overcoming, by practice and making much of the horse, his dislike to the whip when in a passive state in the driver's hand, he should next be taught to know that when it is raised *behind* the shoulder, as if about to strike, the driver can, if he likes, drop it on to his croup. It is a good plan to commence at the halt, flourishing the whip quietly about the horse's head, taking care that the lash does not strike him, and making much of him at the same time. When the horse appears to get steady, the same process should be repeated on the move, and if the horse is found to hang back, assistance from a mounted man with a whip behind will be found useful, the assistant using his whip so as not at first to unduly frighten the horse. After a little time the driver might, as the horse gets confidence, gradually contrive to drop his whip lightly on to his horse's croup. He will usually succeed in this by stroking his horse with his whip when making much of him, and then by degrees passing the whip on from the horse's neck to his croup, and it will be found that except in the case of determined jibbers, the management of whom is dealt with further on, that horses soon begin to understand what is required of them, and that they will learn to dart forward when the driver's whip is raised

* The Author has recommended the links to be fastened to the bits of the led horses, as nearly the whole of his experience has been with fighting stallions over whom the curb rein exercises a wholesome control. It is possible that with geldings it will be found sufficient to fasten both ends of the links to the rings of the head stalls, but even with geldings the use of the bit will be found most useful when manœuvring five horses at a fast gallop.

quickly over their croups. In fact, the horse will learn to appreciate that, whilst there is no cause for alarm on every slight movement of the whip, yet, at the same time, he is thoroughly under the control of the driver, who can, if he likes, use the whip as an instrument of punishment as well as if he were on his back. The whip is not only useful for the purpose of driving horses on, but it has two other most important functions to perform: the one to check an over-impetuous horse during a fast advance, and the other to assist in the turning. It may seem a curious theory, after discussing at length the advantage of teaching a horse to move forward from a whip, to assert that it can also be used to keep him back: but it is a fact nevertheless which any one can prove to his own satisfaction by making the necessary experiment. There is a slight difference, however, in the method of use. If a driver wants to flog a horse for hanging back, he should raise his whip *behind* his shoulder over the led horse's back, when the latter will at once know that it will fall on his croup; whereas when the whip is made use of to check an impetuous horse, if raised at all, it should be raised in *front* of the shoulder, and should be brought to bear on the horse's nose; but, usually, a circular motion of the arm from the elbow to either hand is sufficient. A similar use of the whip will prove useful in turning horses, especially when they are going fast, and it will be found that horses can be drilled till they get quite accustomed to turn with the whip. This treble use of the whip though not necessary when leading one horse, will be found of very great advantage when the driver has to manage five, and as there is seldom any difficulty in accustoming horses to obey the whip, it is well worth while to take a little trouble about it.

Another point which should be paid attention to is to accustom horses to obey the voice. A complicated process is not necessary; and all that is required is, that they should understand the usual sounds made by Englishmen for the purpose of setting horses in motion and stopping them. A light touch of the whip accompanying the sound of the voice each time the horse is set in motion will soon teach him what is required of him, and in the absence of pressure of leg or spur on dismounted horses, it will be found most useful to teach them to move as it were by word of command. Similarly, if the usual sound for stopping a horse is made use of each time the driver pulls his horse up, it will be found that in a very short time he will stop of himself when he hears it.

It will sometimes happen that amongst a large number of horses the instructor may occasionally come across a jibber; and by this term I do not merely mean a horse that hangs back from not understanding what is required of him, but an animal that really jibs from a species of vice, in the same way as we sometimes see horses jib in harness. Every means should in the first place be taken to cure the habit by gentle treatment, and the judicious assistance of a mounted man behind;

Method of managing a jibber.

but in case of failure, recourse must be had to punitive measures, and the following method will usually be found successful. The horse should be handed over to a rough rider to deal with, and it is at this period of the training the vice should be flogged out of him. It is quite useless pulling at a jibber: any attempt at French and English between horse and driver when the former really means to go backwards, whilst the latter wishes to go forwards, can only end in failure, or possibly the man being pulled out of his saddle. The rough rider should take him on the off side to commence with, it being the most handy and convenient, as it leaves the bridle arm quite free. When the horse jibs, instead of pulling at him, the driver should first of all try the effect of his whip. If he finds, as he generally will do, that the horse evades it by turning his croup outwards, or by hanging back still further, he should immediately turn his own horse to the right about, still keeping his whip raised, and allow the jibbing horse to rein back, and instead of making any attempt to prevent him, follow him up on his own horse, who having been turned round is of course going forwards whilst the jibbing horse is travelling backwards. The driver should keep on raising his whip, so as to keep the jibber constantly on the move backwards, and he will find that in a very short space of time the jibbing horse will get very tired. The driver must not, however, let him stop, but by keeping on tapping him on the nose keep him on the move backwards, till the horse will get so done up and frightened that he will become almost Rarefied, and the rider will then take his opportunity for bringing the whip on to his croup. A very little dexterity will be required, for the jibbing horse will be so tired and frightened, that he will be quite unable to get his croup out of the way of the driver's whip, and the latter, when once in a position to use his whip properly, should apply it several times, and he will find that the jibbing horse will soon learn to dart forward every time he sees the driver's whip raised. A very few lessons of this kind, adopting the horse's own tactics, and forcing upon him an unpleasant experience of them, will soon teach him the futility of jibbing. In all ordinary cases of stubbornness a skilful driver will by this method soon eradicate the vice, but in case he meets with difficulty, his hands may be still further strengthened by the aid of a mounted assistant, or by putting a man on the jibbing horse with orders to use his spurs freely whenever he finds him attempting to stop; but the objection to assistance from outsiders is that the effect produced is only temporary, and that when the jibbing horse finds he has no spurs dangling by his sides, and no assistant's whip ready to drop on to his croup, he is apt to again break out in his old practices; whereas when he knows that every time he jibs he gets his punishment from the man that leads him, he is much more likely to give up his bad habit.

Any attempts at rearing must be met by shortening the martingale and the free use of the lash over the horse's head. Few horses will renew the attempt after once having received punishment, for they soon find out how utterly helpless they are when in the hands of a good horseman.

Rearing.

Kicking horses are very dangerous, and, properly speaking, have no business in either a Cavalry or Mounted Infantry Corps. When it arises from vice, a cure may generally be effected by a severe and repeated use of the whip. Sometimes, however, it arises from the horse being ticklish, and in such cases it is very difficult to eradicate. A kicker of this sort can sometimes be made safe by tying up his tail backwards, and making the end of it fast to a D at the back of the saddle, somewhat in the same manner as riding camels have their tails tied, only tighter. The appearance produced is of course not elegant; but this would be a matter of secondary consideration. The true treatment of kickers is to cast them, but this is not always permissible.

The Author has never seen a case where the horse succeeded in making good the attempt, though, as it is occasionally tried, it is as well to guard against it. In case, therefore, the rough rider finds that a led horse on being punished for jibbing or rearing attempts to bolt, it is better to have him linked to two quiet horses when he will be under the most complete control. In fact, it is a good plan with all very unruly horses—whether the unruliness originates from vice or timidity—to carry out the taming process between two horses. It is perhaps hardly necessary to add, that the horses ridden by rough riders when breaking in unruly horses should themselves be quiet, and the bigger they are the better.

Horses should be changed from the near to the off side every quarter of an hour or twenty minutes, and similar changes should be made in the horse the driver rides, so that each horse may get thoroughly accustomed to work on either side or as a driver's horse. In addition to horses being trained to be submissive when led with the reins in the driver's hand, they should further be taught to obey their driver when he has only the reins hanging loose over the bend of his arm. In this case the reins should be shortened by tying a knot in them, and it will be found that the driver can exercise a considerable amount of power over his horses from his elbow joint; in such cases the assistance of the whip in turning and checking the horse will be invaluable.

Great care must be taken to prevent led horses getting into a habit of hanging back, and leaning heavily on the driver's arm, or hugging the driver's horse too closely. The former can easily be prevented by the judicious use of the whip. The habit of a led horse remaining half a length behind is not only wearisome work for the driver on whose arm he is leaning, but it is a great temptation to the driver's horse even when naturally quiet, to kick. The whip is the only remedy. Led horses can easily be prevented from hugging by the driver taking his foot out of the stirrup and allowing the spur to come in contact with them whenever they get too close.

After the men have accustomed their led horses to understand and obey the whip; and to go steadily at a trot, Men and horses should be trained to work at a gallop. they should be taught to move with their horses at a gallop, and no man should be allowed to proceed with the second lesson till he is able thoroughly to control a single led horse at that pace. It will probably be found in practice that for the ordinary riding of an average trooper about three weeks will be amply sufficient to enable a man to get through this lesson.

If the first lesson is all important, this is only less so in a trifling degree; and it may be safely affirmed that a man who is successful in the first and second stages will have got over the principal part of the difficulty. It should be commenced by taking both the led horses on one side, and the sides should be frequently changed. The method of fastening the links and holding the reins is as follows:

Pass the curb rein of the inside horse direct into the right hand of the driver; the curb rein of the outer horse also to be passed into the same hand through the upper ring at the back of the head stall of the inside horse; one end of each link to be fastened to the bar of the curb bits of each led horse, and the other end to the lower ring at the back of the head stall of the horse immediately next on the inside, the reins in all cases being above the links. The reins will at first feel somewhat of a handful to the novice, but he will soon get accustomed to the handling of them. They should be held with the third and fourth fingers between them separating the reins of the two horses. In the case of horses led on the near side, the rein of the inner horse must be knotted so as to admit of its being the same length as the reins of the outer one. This is necessary because the reins of the horses on the near side are suspended on the elbow joint, and it is necessary, therefore, they should be of equal length. By this arrangement the free use of the bridle hand is secured, and it will be found in practice that the driver will at his pleasure be able to exert a pressure on either horse without interfering with the other.* If the horses have proved themselves quiet in the first lesson, it is not likely that they will be found to give much trouble when coupled together; but it will be as well if there is any difference between them to place the one that is likely to give the most trouble on the inside to begin with. The exception to this is the case of kickers who should always be placed outside where there is much less chance of their doing damage. More practice will be required in this stage to attain a proficiency in the skilful management of the whip, inasmuch as the rider has now to be able to make it reach the outside horse, and to do so without unduly frightening the one on the inside. A few lessons, however, will overcome any little difficulty, and all that need be said is that nothing is required but practice, and that

* When both reins are too long, they must both be knotted; but in this case also the due equality of length when hanging on the driver's arm should be preserved.

here, as in the first lesson, the driver may, if his outside horse hangs back, be assisted at first by a mounted assistant. Afterwards he should be able to manage to get on without such assistance. When two horses are being led on the same side, a very good way of getting at the outside one, if he is inclined to hang back, is to make a sudden turn to the hand the horses are on, which will generally place the croup of the outside horse within very easy reach of the driver's whip. Practically, however, very little difficulty need be anticipated; in case of either horse actually jibbing, he should be separated, and have a lesson by himself, and be always afterwards led on the inside till he has been cured of his jibbing propensities. The method of turning the horses is exactly the same as with one horse; the horses when on the inside should be checked, and when on the outer circle should be pulled round, partly by the driver himself, and partly by his horse. It will be found in practice that after a few lessons the led horses will soon get into the way of following the lead of the driver's horse, and will turn of themselves, an inclination on their part which should be developed by accustoming them to obey the direction of the driver's whip.

The horses should not only be taught to go when the driver has hold of their heads tight by the bridle, but also with the bridle hanging loose on the bend of the arm, the rein of the inside horse, as before stated, being knotted to make it of equal length with that of the outer horse. And the lesson should, furthermore, be varied by separating the horses and putting one on each side, the rein of the off horse being held in the right hand as before directed and the rein of the near horse hanging on the bridle arm, leaving the free use of the bridle hand itself to the management of the driver's horse. The horses should likewise be changed every day so as to vary their respective positions, and to accustom them to go quietly wherever required. Before quitting this stage, and passing on to the next, the driver should have acquired a thorough mastery over his two led horses, and be able to lead them, or turn them at a gallop, either with both on the off or near side, or with one on each side. Three weeks will probably be found ample to secure the necessary proficiency.

By the time the men and horses enter into this stage of the proceedings, the back of any little difficulty that may have existed at the commencement may be said to have been broken. The men will have gained self-confidence, whilst the horses, from the training they will have received, will have become submissive and obedient. Practically, therefore, there is no real necessity for dividing the remainder of the manege instruction into two portions, and the man who can manage two led horses in all positions with ease may safely undertake four at once. In accordance, however, with the received theory of the necessity of instruction of this kind being progressive, it is suggested that a short period, say a week, be devoted to the leading three led horses, that

Positions of the horses should be constantly changed; also method of handling the reins.

Third lesson. Three led horses.

is to say, two on the off side, and one on the bridle arm on the near side, after which the last stage of the manege instruction may be entered upon, and as the few remaining observations I have to make apply equally to both, I will pass on at once to the fourth lesson.

In this stage the reins of the two horses on the off side should be held in the right hand, and those of the two on the near side should be suspended on the bend of the left arm, the bridle hand being left unencumbered for the management of the driver's own horse. Although this should be the ordinary way of holding the horses, the driver should now accustom himself to quickly shift his reins from one position to another; thus supposing he finds his own horse pull very hard, he should be able quickly to shift his right hand to the temporary assistance of his left. Similarly, if the near pair of horses are inclined to go faster than is required, he should be able to slip the bridle of his own horse temporarily into the right hand, and thus enable himself to have the complete use of the left arm for the control of his unruly horses. Then, again, suppose he finds the outer horse of the near pair hanging back and leaning heavily against his arm, and he experiences a difficulty in getting at him without to a certain extent swinging his body round, he should be able to slip the reins of his off pair into the bridle hand of his own horse, so that he may have the right arm perfectly unencumbered for the free use of the lash. If the jibbing horse is on the off side, he will slip the reins of his off pair into his bridle hand, which will enable him to use his whip so as to get at the horse that is giving him trouble. It may possibly happen that when a driver handles a team of five horses for the first time, he will for the first day or two feel a little awkward; more particularly if his horses should be troublesome and pull at him in opposite directions. He need not, however, be alarmed; for so long as the tackle is sound, the horses cannot get away, and as they seldom all pull in one direction, they are a mutual check on each other. If the team is unruly, which is not likely to occur if they have been well drilled previously, all the driver need do is to keep cool; let him watch for and recognize which is the real culprit, and make up his mind resolutely to give him three or four cuts of his whip, and he will find he will soon become submissive. A horse that has gone quietly in threes, and gives trouble in fives, generally does so because he thinks he is not under control, and the sooner he is undeceived the better. In cases of this kind the driver should be very careful not to let his horse hang back, a very common fault with beginners, and a very bad one too; inasmuch as if the led horse on either side kicks, it increases the chance of injury to his horse, besides inducing his horses on one side to cross his front and get entangled with those on the other. In all cases of difference of opinion between the driver and his team, the former should keep his legs well closed to his horse, and he should remember that even if the reins are snatched out of his hand, no great harm is done, for the links effectually prevent the horses getting away

and always keep them within reach of his whip, though of course it is much better not to let them go if it can be avoided. Here, however, as in twos or threes, if the team is really troublesome, it is much better to hand it over to a rough rider who in bad cases should drill the horses in pairs for a day or two till they go quietly. It is not necessary here to enter into all the possible contingencies which do sometimes occur with vicious fighting stallions, as they are not likely to be met with in regiments where the horses are castrated ; and it is sufficient to say in conclusion that this last lesson should be devoted by the driver to making himself and his team as handy as possible, and by applying the principles laid down in the first two lessons to put on as it were the finishing touch to the whole. The duration of it would probably be about three weeks.

SECTION II.

At the conclusion of the drill carried on in the manege, as laid down in the last section, the horses will be found tolerably submissive and fit to commence work in the field. The first few lessons should be elementary, and should be directed, partly to practising the men in mounting and dismounting, and in linking and unlinking their horses, and partly to accustoming the drivers to lead their teams independently in different directions and without any assistance from others. The squad should be formed in single rank, with intervals of five yards between the fives, and increased distance from knee to knee, and the first ten or fifteen minutes should be devoted to mounting and dismounting the men from the halt, so as to get them into the habit of linking and unlinking their horses smartly and as rapidly as possible. After this practice has been concluded, the men should be made to close to their centre, and after having been told off by fives an instructor should be appointed to act as whipper-in. The word will then be given "Right," or "Left," or "Centre extend," "Gallop," "March." The centre or other fives named advance straight to their front at an increased pace inclining to the right and left till a distance of five yards is obtained between each fives. It will be sufficient for the purposes of elementary drill to allow the men to advance 100 yards, and then to sound the halt, on which the men who are to act on foot immediately dismount, and linking their horses as fast as they can, hand their reins to the drivers, draw their carbines out of the buckets,* and form a line of dismounted Skirmishers with an interval of two yards between each man. The dismounted horses as soon as the drivers are ready are put "fives about," and the order is given for a movement to the rear, the whipper-in cracking his whip once or twice smartly to insure the led horses getting off without any delay. The dismounted horses will be taken off at a gallop for about 100 yards, and then halted and fronted. A dismounted Skirmisher will then be told to put his puggree on his carbine which will be a signal to the drivers that their horses are wanted to the front. On seeing this signal the whipper-in will immediately commence cracking his whip, and the drivers will take their horses to the front at a gallop. On arriving within a few yards of the dismounted Skirmishers the latter get up and meet them as they are being pulled up, the links are unfastened, the carbines are returned, and the men get on their horses as quickly as possible closing to the centre man of the squad who should go to his immediate front. This practice should be frequently repeated during the lesson, and the instructor by looking at his watch occasionally will see what improvement takes place from time to time. With a smart

* I have purposely recommended that the carbines should be drawn at this period, as I have found after repeated trials that the men are ready to act on foot quicker by allowing them to draw carbines *after* their horses have been linked together. This however, would probably not be the case if the men's sword belts were provided with a hook on which the carbines could be suspended.

active set of men the dismounted men will dismount, link their horses hand the reins to the drivers, and the latter will be ready to start in twenty seconds, but this is rapid work, and the instructor may be satisfied if he gets his dismounted teams off in thirty seconds from the time of the horses being pulled up. About a similar time, or perhaps a trifle less, will be required for the men to unlink horses, mount, and close to the centre. The lesson should then wind up with the squad being broken up into separate teams of fives, and the drivers should be made to manœuvre them independently, and in separate directions, so as to get them into the way of going separately as well as in a body, and without any assistance from a whipper-in.

After about a week of this practice the men should be taken to rough ground, so as to get into the habit of galloping with their led horses over a country where natural obstacles are met with, and at the same time the men when dismounted should be instructed without any particular orders to take every advantage of the irregularities of the ground; where there are nullahs and bushes these will be made use of; where the ground is absolutely flat they will incline to the right or left if cover is available near; otherwise, they must be taught to throw themselves down flat on the ground. Above all it should be instilled into them that they are not to wait for orders, but to make use of their own intelligence, and when words of command are given by the Commander of the Skirmishers they will be passed on to both flanks by the men themselves. The men should also be taught to get into the way of working to the direction of the wave of the Officer's sword, more especially in cases of advancing or retiring a flank or the whole body of Skirmishers. The lesson should finish up with the squad being broken up for the purpose of the drivers manœuvring their teams independently.

After the men have been drilled for a fortnight on broken ground they should be taught how the mounted and dismounted men should act in combination, how to protect their flanks from surprise, and what to do in certain given contingencies; in fact, should be instructed in what they will be required to do in the presence of an enemy. For this purpose the Squadron should be drilled entire with its full complement of Officers and Serrefiles, in addition to which there should be two extra men in the serrefile rank of each troop to act as whippers-in to the dismounted horses.* If farriers are available they can be utilised for the purpose, in which case only one extra man will be required on each troop in the serrefile rank. The Squadron

* The whippers-in are not only useful for driving on horses that may be disposed to hang back, but in case of any man requiring temporary help, say from a horse being shot, or bridle coming out of a horse's mouth, the whipper-in can dismount and render assistance.

should then be told off by "Fives" from the inward flanks of Troops, and it will then receive the word, "the Right Troop will skirmish dismounted, the Left Troop will support." On this word of command being given, the Right Troop leader gives the words "Right Troop from the 'Right,' 'Left,' or 'Centre' extend," 'Gallop,' 'March.'" Each fives but the one named will extend to the Right or Left as the case may be, by inclining till an interval of five yards has been gained between each team, each rear rank fives being on the left of its front rank. On arrival at the spot where it is intended the men should act in a dismounted capacity, and which should always be outside the zone of Infantry fire, except in cases where the natural features of the ground afford good covert. The Troop leader gives the word "Halt," on which the men to be dismounted should at once, and without any further instructions, dismount, link their horses, hand their reins to the drivers, draw their carbines from the buckets, and, when once within range of fire, immediately make for the nearest shelter available; and if none is obtainable, they should throw themselves down flat on the ground at intervals of two yards between each man, load their carbines, and await the orders of their Squadron leader, who, with the Troop leader dismounts and assumes the command of the dismounted men, the latter acting as his assistant. The drivers after being put about, immediately gallop with their horses to the rear, the Troop Serrefile taking the horses of the Squadron and Troop leader, the Squadron Serrefile taking command of the dismounted horses, and the whippers-in bringing up the rear. The dismounted horses will be taken as far to the rear as may be considered necessary for the operation which is about to be performed, or in accordance with special instructions which may have been previously given to the Squadron Serrefile by the Squadron leader. At the very same moment as the Right Troop commences to extend, the Left Troop leader detaches three or more pair of Scouts* to his right and left, whilst he himself with his Troop will advance at a steady trot behind the extended Troop at the distance of about 100 yards. The Scouts will take up positions to the right and left according to the nature of the ground; their object being to prevent the possibility of any sudden Cavalry attack on the dismounted horses from either flank. In a moderately open country the position of the Scouts would probably be somewhat similar to that shown in diagram No. 1. In case of the dismounted men acting some distance in front of their horses, two other mounted men as connecting links will be required to keep up the communication between them and their horses in the rear. When the Right Troop halts preparatory to dismounting, the Left Troop leader will give the word "Walk," and on the approach of the dismounted horses he goes about and precedes them on their march to the rear. When the dismounted horses are required to the front, the signal will be the puggree placed on the muzzle of the

* All men in Mounted Regiments should be trained to act as Scouts, but it would be advisable to place the most intelligent on the flanks of both ranks, so that they may be more handy when suddenly ordered out.

carbine, on seeing which the mounted troop will at once gallop in the direction of their dismounted comrades, and the dismounted horses will at the same time be brought up by their drivers behind the Left Troop at a gallop. The dismounted Skirmishers on the approach of the mounted troop open the front by closing to both flanks. The mounted troop passes through the opening, and the dismounted men running to their horses, unlink and mount as quick as possible under the protection of the mounted troop in front. Whether an advance or a retirement will be necessary will of course depend on circumstances, but in either case the dismounted men, the moment they are on their horses, will close to the centre and re-form troop.

In order to determine the distance between the led horses and

General principles for regulating the distance between the men fighting on foot and their led horses when operating on a small scale.

their riders in front, we must not only take into consideration the features of the ground, but also the nature of the operation which is about to be performed. It will be convenient for a clear apprehension of the subject, to remember that Mounted Infantry may be called upon to

carry out either minor operations, such as would fall to their lot in detached situations, or those larger combinations which would be carried out in conjunction with the other branches of the service. In the former case, if the men are to act by themselves on a small scale, if they are ordered to do some audacious act, and to get away as fast as possible when threatened with an attack from the enemy, the dismounted horses should be as near as possible, consistent with safety from fire. Scouts should always be employed on the flanks as laid down

Employment of Scouts.

previously, so as to give the men fighting on foot timely notice of any approach of the enemy's Cavalry or Artillery from either flank, so that, if necessary, a rapid retreat might be made to prevent all possibility of their being cut off. It is difficult to lay down any exact orders on the subject of Scouts. The men employed should be possessed of intelligence and resource; they should be the best mounted men in the Regiment; they should be so well horsed that any attempt on the part of the enemy to capture them would be quite hopeless. The general idea that should be given to them is, that they should keep such a sharp look-out that a sudden attack from the enemy's Cavalry or Horse Artillery in rear or flank of the dismounted men or the dismounted horses would be quite impossible. As they will be some distance off, it is necessary that they

System of signalling for Scouts.

should be taught one or two simple signals. Anything like a complicated system should be avoided, as the men have quite enough duties to perform without being converted into Army Signallers. Very little appears to be necessary. The Scouts should be furnished with a small white flag, which is easily seen from a long distance. When this is displayed, it should indicate danger; when waved, that the danger is most imminent. When assistance is required from the mounted troop either to relieve a Scout that is sick, or for the purpose of detaching reconnoiters still further towards the enemy, when a proper view

cannot be obtained by the Scout furthest in advance, or for some other purpose of a similar nature, the helmet may be placed on the top of the carbine, on seeing which the Officer Commanding the Support will detach an extra Scout or two in the direction from whence the signal is made; the scouts, when not forcibly driven in, will remain in the advanced positions to which they have been detached so long as the dismounted men are fighting on foot, but as soon as they see that the led horses have been signalled for, and that the dismounted men have

How the Officer Commanding the dismounted men should act when he sees the Signals.

abandoned the position in which they were fighting, they should rejoin their Troops. It will now be advisable to consider what should be done when the signals displayed by the Scouts have been seen by the party from whence they were detached. Bearing in mind that the operation on which the dismounted men are now being employed is of a minor and temporary nature, it becomes apparent that any attempt on the part of the enemy to cut off the dismounted men, who may be now possibly in some isolated position, must be most scrupulously guarded against. When, therefore, the Officer Commanding the Support sees the flag being waved, he must at once send his dismounted horses to the front, as fast as possible, so as to bring away the men fighting on foot, and at the same time detach a man to give information to the Officer Commanding them in case he himself should not have noticed the signal. In case of the signal indicating that there is danger, though not imminent, it will be for the Senior Officer to decide whether a retreat should be made at once, or whether it should be delayed till more imminent danger is signalled. He will of course be guided in his decision by the effect his fire is producing. If he thinks it is of great importance that he should hold on to his advanced position till the last moment possible, he will run the risk of the delay; if, on the other hand, the effect of his fire does not appear to him to warrant running any risks, he will at once signal for his horses and get away as fast as he can. Scouts will, of course, before being detached receive full instructions, in writing, so as to guide them in determining what constitutes danger, imminent or otherwise.*

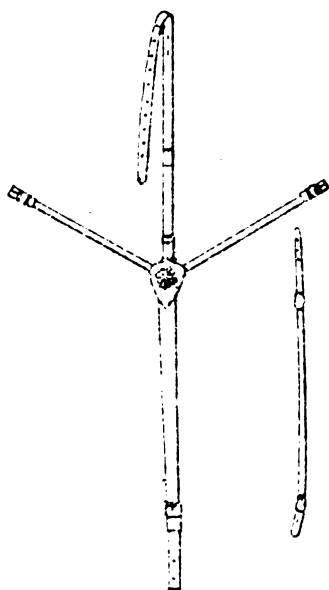
The above suggestions which, it is proposed, should regulate the

Distance between led horses and dismounted men when employed in large masses on the field of battle.

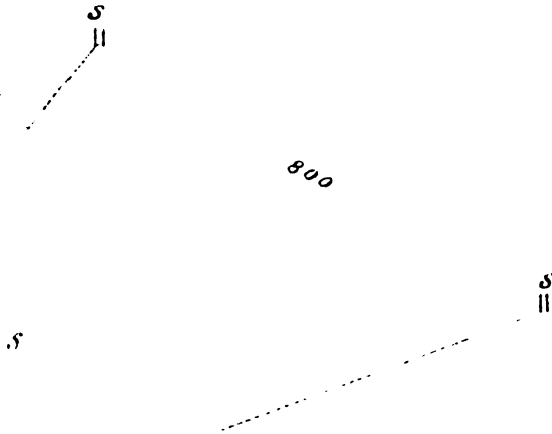
connection between the mounted and dismounted men when the fighting is on a small scale will require some modifications when larger and more important operations have to be performed, and the difference between the two cases which should be borne in mind is this. In the former the aim of

* In cases where a more accurate and detailed report of what is going on in front or on the flanks is required, specially trained mounted men from the Army Signalling Department should be sent out with the Scouts to enable full reports to be transmitted to the Officer Commanding. It is inadvisable to insist upon a complicated system of signalling from the Scouts themselves, as their other manifold duties are quite as much as they can well manage without being taught too much Army Signalling, which should be more properly left to a separate Department especially trained for the purpose, a few selected men of which should be formed into a Mounted Establishment for the express purpose of acting in combination with the Mounted Branches of the Service.

the dismounted men is to produce some temporary result, but being detached in small numbers they are unable to oppose an effectual resistance against any large force that may be sent against them, and hence it is of vital importance that the connection between the men fighting on foot and their horses in rear should be so close that they can when necessary, get their dismounted horses up from the rear at a moment's notice, and secure their safety by flight; but in cases where the operation to be carried out is on a larger scale, where the various arms of the service unite for a combined operation, where the Mounted Infantry would be, as it were, merely the advanced guard of the Infantry coming up slowly from a distance, it would be unnecessary for the horses to be so closely connected with their riders. In such cases it should be remembered that the very numbers of the Mounted Infantry are calculated to admit of a prolonged resistance, and that the Regular Infantry, are approaching in second line from their rear. Under such circumstances rapid retreat would not be necessary; the dismounted men must be considered as Infantry, and their training having been adapted to enable them to fight and manœuvre on foot, they would act under all circumstances exactly as the Regular Infantry itself, and if forced to retreat would do so as foot soldiers. Their horses, therefore, should be much further to the rear than in those cases where the operations are on a minor scale. But though the connection would not be so close as to admit of their being brought up at a moment's notice, still, the touch should not be lost hold of. There should be mounted connecting links between men and horses, and when the services of the dismounted men were no longer required in front, instructions should be sent for the horses to be brought to some spot in the rear where the line of battle would not be interfered with, and the Mounted Infantry retiring on the same would resume their functions as Cavalry soldiers.



***MARTINGALE ATTACHED TO BREASTPLATE AND
LEATHER LINK.***



S Time man divides the distance
between the Support and Scout
farthest in advance.

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III.

PROPOSED PLAN FOR GIVING INCREASED EFFICIENCY
AND GREATER MOBILITY TO A M. L. R. 9 POUNDER
FIELD BATTERY.

BY MAJOR W. B. E. ELLIS, R.A.

It is well known to every officer or man who has had experience on the March or in the Field that the wagon bodies are undoubtedly the greatest impedimenta in a M. L. R. 9 pounder Field Battery. Now, the following plan proposes to do away with the present wagon bodies and to substitute a system of limbers *which should be uniform in every detail of equipment*, and thereby to ensure that every round of ammunition shall invariably be able to keep up with the guns over all country that is practicable for the latter. Many instances will no doubt occur to the mind of the reader when ammunition wagons have been unable to get over difficulties of country at the same rate as their guns—and in fact have been left far behind. The manner in which the proposed change could be carried out is so very simple that it is a matter of surprise that something of the kind should not have been done before. We know that every ammunition box on the limber of a 9 pounder equipment, contains 18 rounds and that there are 4 rounds more in the axletree boxes. This gives a total of 40 rounds with every gun, without its wagon. Now, by a very slight lengthening and a still more slight widening of each ammunition box, and by a little alteration of the interior it is found that 26 rounds can be easily carried in every box. This would give with each gun, without its wagon, a total of $2 \times 26 = 52 + 4$ (rounds in the axletree boxes) = 56 rounds per gun—or 16 rounds more per gun than now, and hence *96 rounds more per Battery than at present—when the guns are separated from their wagons*. So far for the guns and their limbers. Now, if instead of every one of the present wagons, we substitute 2 limbers, each with two such boxes (holding 26 rounds), we would have a total number of rounds with each sub-division of $3 \times 52 = 156 + 4 = 160$, and this is twelve more rounds per gun than at present—for a gun and its wagon, now, only carry 148 rounds. In the whole Battery by this proposal there would be therefore $6 \times 160 = 960$ rounds—whereas the established plan carries only 888—*showing a gain of 72 rounds with the Battery*.

It may be noted here that without any additional horses, one of these limbers might be drawn by 4 horses, and the other by 2 horses. There is a difficulty which at this stage will probably have suggested itself to the reader, and this is, how are the spare wheels and spare shafts and other stores to be carried which are at present on the wagons? This difficulty is however more imaginary than real, and is proposed to be met as follows. Retain 2 out of the present 6 wagons, but take off the 4 ammunition boxes now carried on each wagon body. Alter the perch so as to make a similar arrangement for carrying a spare wheel in rear, as there is now in front, making thus a total of 4

wheels carried. These wheels could also be carried much nearer together on this wagon body than at present, and the perch would have to be of the same strength and make behind the axle as it is in front with respect to carrying wheels. On this wagon body two lightly constructed boxes could be placed over the axle, and between these spare wheels. These wagons could be so arranged as to hold all stores, &c., which may have been left out by the elimination of the other 4 wagons from the Battery. Two spare shafts could of course be carried under each of these proposed altered wagon bodies. It will be clear that in this manner an addition to the Battery of 2 wagons, is contemplated. These wagons being light could be well drawn by 4 horses each, entailing a total increase to the present establishment of each Battery of 2 wagons, 4 drivers, and 8 horses. But let us look into what these additional wagons, *together with the proposed system*, would carry. Each of these wagons would have a similar limber to that above proposed, that is each would carry 52 rounds, or a total of 104 rounds. This would show a further increase of 104 rounds to the Battery, or a total of $960 + 104 = 1,064$ rounds, *which is 176 more than are now carried*—or within 4 rounds of 30 rounds per gun extra. Now, this additional ammunition, and the extra spare wheel (as there are now only three) could not be carried on the present system except by two wagons—as we know that each such wagon only holds 108 rounds, and the remaining 68 rounds would necessitate another wagon. Two of the present wagons require a total of 12 horses, and 6 drivers whereas the proposed wagons could be drawn by a total of 8 horses, and 4 drivers.

Taking the additional 176 rounds and the extra spare wheel into consideration, we would then have an actual saving of 4 horses, and 2 drivers. It is true that 2 of the present wagons, each drawn by 6 horses can carry 216 rounds, or 40 rounds more than the additional rounds that could be carried by the proposed extra wagons—and altered system—but against this there appear to be many advantages, some of which are as follows:—

- 1st.—*The great obstruction to mobility, viz: the wagon body with 4 ammunition boxes piled on it, would be done away with.*
- 2nd.—*Every portion of the ammunition of the Battery would be as moveable as the gun itself.*
- 3rd.—*96 more rounds would be carried with the guns when manœuvring by themselves.*
- 4th.—*176 more rounds (or 30 more rounds per gun) would be with the Battery—and one additional spare wheel.*
- 5th.—*There would be two lines of limbers instead of the present line of wagons. The first line of limbers would have 4 horses each, the second line 2 horses each. The first line would correspond to the present wagons—the second line would be further to the rear. The supply of ammunition*

in the field would be both rapid and easy—for, when the gun limbers were becoming empty these might be sent to the rear with 4 horses, 2 being retained with the guns. The first line of limbers then come up with 4 horses each—and are completed to six by the pair retained at the gun. The empty gun limbers when they arrive at the second line of limbers give up two more horses each—and the second line of limbers replaces the first line—the empty gun limbers go to the rear to the reserve Park to be refilled, and then take up the position vacated by the second line of limbers, and so on. Every limber being interchangeable also, a disabled limber could be at once replaced by another.

6th.—There would be a loss, on the present system, of 108 rounds, 6 horses, and three drivers, if a wagon were blown up—on the proposed plan a first limber blown up would cost only 52 rounds, 4 horses, and 2 drivers.*

7th.—It is also easy to understand that a limber can find cover from fire far more readily than a wagon, and the limbers being in two distinct bodies some distance apart, makes them still more safe from the fire of an enemy.

8th.—Although the proposed limbers may be heavier than the present ones, yet they are much lighter than the wagon bodies which are intended to be discontinued. These latter would be very difficult to remove if their limbers had replaced disabled gun limbers.

There would be no difficulty in carrying all the gunners on this plan any more than on the present system. With the guns working alone there need be no alteration—as there are places laid down for 1 non-commissioned officer (mounted), and 5 men, on the limber and axletree seats—the remaining 3 men could ride on the 1st line of limbers. If we suppose the guns and all the limbers to be together, as are now the guns and wagons of a Field Battery at Regimental drills—then 3 men could ride on the gun limber, 3 men on the first limber, and 2 men on the second limber, making a total of 8, the “number one” being of course mounted as at present. No difficulty is apprehended from the additional weight of each limber, caused by carrying 16 rounds more—and the balance of the Shafts or Poies will, it is hoped, be within manageable limits. Also the limbering up of the gun will not, it is thought, be likely to be interfered with. But all this can only be proved by actual experiment.

Should however the proposed limbers prove successful, there would, probably be much advantage to the Field Artillery service by supple-

* A very likely occurrence, if wagons are brought up close to guns in action to replenish limbers.

menting this proposal with some other important alterations as under Poles might with advantage replace the present Shafts ; and without entering into any long argument on the much vexed question of Shafts versus Poles, it may be safely said that Poles are lighter, more simple, and cheaper—and more easily replaced on service. Besides, poles admit of the very great advantage of the introduction of *one uniform set of saddlery and harness for every horse whether in draught or not, and available for any place in the whole Battery.*

Whereas the present system has one kind of saddle for a mounted man, one kind of harness with a different saddle for a led horse but the off saddle has no stirrups, a different set of harness for a near wheeler, and particular harness for an off wheeler, with a pad instead of a saddle. And what is to be done when a Shaft horse's harness is damaged, and there is no other set of similar harness close at hand ? Any one with a little experience will probably have witnessed such a dilemma. It is also much easier to train a horse to a Pole than to Shafts, and very much less trouble to extricate a fallen horse with Poles than with Shafts.

The very general use of Poles on the Continent of Europe is again sufficient proof that there is no practical disadvantage in them. *The weight of the carriage on the horses is more equally divided between the wheelers in Pole draught than with Shafts, and this is important, when we propose an addition of 16 rounds to every limber, and to have a system of limbers only. With Pole draught we might introduce "Bricole" harness, or something of the kind—and do away with very much of the weight of the present harness—which is very heavy.* Collars also are conspicuously inconvenient in many ways—as they must fit particular horses, and if horses or collars get at all mixed up in the unavoidable hurry of embarkations and disembarkations, or other contingencies of active service, or owing to casualties among the horses—much inconvenience will be immediately felt.

Again, there is much that is disadvantageous in having two sets of men—one as gunners, and the other as drivers or postilions. Every one has at times witnessed the awkwardness arising from several drivers being obliged to fall out on parade, when their places have been temporarily filled by gunners, as spare drivers are generally few in number, and these gunners are not taught to ride or drive and have had to mount in their unsuitable trousers. Drivers on the other hand cannot efficiently replace gunners, as they are not thoroughly instructed in gunnery, and do not go through the annual course of gunnery instruction, or the annual practice. Casualties on service among either gunners or drivers could therefore only be efficiently made good by men of the same sort as the casualty has occurred among. Hence it would seem more practical to have *but one set of men as Field Artillery men—dressed—equipped—and trained alike—and equally ready to ride, drive, or to work a Field gun.*

It is not necessary to go to extremes, and an average sized man of from 5 feet 6 inches to 5 feet 8 inches would make a useful Field Artillery man all round. The old colossal style of man for Field Artillery and Garrison Artillery at pleasure, was as great a mistake as the two distinct sets of men we have now. There is a very vast difference between the duties and training of Garrison and Field Artillery, and these bodies may at length be almost considered virtually permanently separated. This will be all the more necessary with a system of short service.

There have been very many expedients tried from time to time of carrying the gunners of Field Artillery at a rapid pace. It may not be known to every one that even the Royal Horse Artillery, in Egypt in the year 1801, carried gunners on the draught horses, with Pole draught, and 2 men on the axletree seats; but the old Bengal Horse Artillery plan is well known. Besides this, there have been very many different ways of carrying gunners practised in continental armies; and several experiments of various kinds have also been essayed of late years, both in England and in India. Without making any reference here to the present system of that portion of the Field Artillery called Horse Artillery, it must be a matter of astonishment that for the Light Field Batteries we should, after all our practical experience, apparently rest satisfied with the miserable makeshift of the axletree seats. *Of course the gunners of a Light Field Battery should always march on foot, unless the Battery is required to move rapidly—so as to keep the horses fresh for such occasions.* And it is not difficult to equip a man so that he may be available at will for either mounted or dismounted duties. Any sportsman will well understand this, for he will often have been mounted and dismounted alternately in the course of the same day. There is no necessity for putting every man into knee boots—which would have many disadvantages on active service. It will be also apparent that a light field kit could be carried for every man in a small valise behind every saddle. Tents and other impedimenta should be carried separately, as for other Troops. May it not now be concluded that the above proposals would very much increase the efficiency of a M. L. R. 9 pounder Field Battery, and also give to it a very much greater mobility?

NOTICE.

Members are particularly requested to pay their arrears of subscription, either to the Secretary, or to the Alliance Bank, Simla.

Should any Member who wishes to cease, or has ceased subscribing, continue to receive copies of the Journal, it is requested that he will kindly communicate with the Secretary.

Members who have been on furlough, and have never expressed their intention of withdrawing from the Institution, are on their return to this country supplied with the journal and their subscription is due from the date of such return.

H. H. STANSFELD, LIEUT.-COLONEL,
Secretary U. S. I. of India,

Simla, 19th June 1876.

NOTICE.

UNITED SERVICE INSTITUTION OF INDIA.

AN Exhibition of Military Drawings will be held at Simla during September 1876. All drawings intended for competition to be with the Secretary by the 15th September.

The first prize will be a Gold Medal, or vase or shield of Lucknow work, of the value of Rupees 100, and the second prize of the value of 50 rupees. All officers in India, whether members of the Institution or not, are eligible to compete for the above prizes.

The drawings to consist of Military sketches of ground, executed in the manner taught at the Garrison Instruction classes throughout India.

The first prize will not be awarded for a copy.

Two additional prizes of the value of 70 and 30 rupees respectively are also offered for competition to all non-commissioned officers and privates of Artillery, Cavalry and Infantry doing duty with their regiments in India. The conditions the same as for the officers' prizes.

The prizes will be awarded by a Committee of the Council.

By order of the Council,

H. H. STANSFELD, LIEUT.-COL.,
Secretary United Service Institution of India.

NOTICE.

MEMBERS of the Institution who have not already done so, are earnestly requested to pay their arrears of donation and subscription, either to the Corresponding Member at their station, or direct to the Secretary at Simla.

Some members still owe their donation and three years' subscription.

Officers who may wish to become members are requested to be kind enough to forward their donations and subscriptions at the same time as they express a wish to join the Institution, and also to inform the Secretary whether their subscription is intended to be for the current year, which ends on the 31st May 1877.

Members can pay their subscription to the Alliance Bank, Simla, if more convenient, and the Bank will grant receipts for any money sent.

The entrance fee is 5 rupees and the annual subscription 5 rupees.

Members on changing their addresses are particularly requested to notify the change to the Secretary, in order that delay in forwarding the Journals may be avoided as much as possible.

The address book is corrected up to date from the Army Lists, but mistakes are occasionally unavoidable, unless members themselves promptly notify their change of residence.

Members proceeding to England on leave, who wish the Journal to be forwarded to them while absent from India, should inform the Secretary, and send stamps for the overland postage by Brindisi or Southampton as they desire.

When a member appears in orders for leave to England, his Journal is not despatched unless he asks for it, and while absent from India his subscription is not payable unless the Journal is supplied.

Members on return from furlough can obtain the numbers of the Journal that have been published during their absence, by paying the subscription for that period, and all members on returning to India should inform the Secretary of the fact at once.

The Secretary will be happy to send an Index to volumes I, II, III and IV to any member wishing for the same.

H. H. STANSFELD, LIEUT-COLONEL,

Secretary.

ORIGINAL PAPERS.

I.

SOLDIERS' INSTITUTES FOR THE NATIVE ARMY OF INDIA.

IN the present day, when so much is being done for the welfare of the British soldier, his wife and children, both at home and abroad, does it not behove us, Indian Officers, to bestir ourselves and to endeavour to raise the social status and moral condition of the Sepoys who form the native portion of our Indian Army?

It is well known that this status and condition is far below what it should be; we may also say, without fear of contradiction, much below what it might be.

Much has been written on the subject of re-organization: much has been said with regard to the steadily increasing paucity of good soldiers. We hear on all sides that our recruits are not what they used to be, and that the class of natives coming forward to join the ranks of our native army is worse and worse day by day.

But it may well be asked what have we done to counteract the general dislike amongst the old stamp of men, who used, not so many years ago, to flock to our standard? Some tell us that until we raise the pay of the sepoy we shall never again get the old type of Indian soldier. Undoubtedly, an increase of pay would offer great inducements to a higher stamp of men to enlist, but cannot we do more for them than this? Cannot we make their every-day life in our Army a more pleasant one than it is at present? Cannot we relieve the monotony of their leisure hours, and by redoubling our interest in their welfare, counteract the far from healthy tone which exists from the idle lives they usually lead?

There can be no doubt, but that we should try. The subject of native life and character is a very delicate one, and very little understood; but for all that, we should not allow any obstacles which may lie in our path to deter us from a strenuous effort on behalf of our native soldiers. It should be our duty to gather all the information we possibly can with regard to the subject before us, and then having laid down some few broad principles, proceed to some definite line of action.

Sir William Muir, speaking on the subject of a Government Life Insurance for India, says—"The existing data as to the inner life of the "native of India—if indeed data worth naming exist at all—are too "meagre to found safe calculations upon." Now, there can be no doubt but that our knowledge of domestic life in India is very limited. But why should we hesitate? Is this not all the more reason why we should endeavour to raise the veil which at present envelopes their lives and characters. We Indian officers should have great opportunities for experience in our daily and hourly intercourse with native soldiers of all castes and religions. What light then can we throw on this mystery, if mystery it can be called.

Very little, it is to be feared. There are great difficulties in our path. The most energetic, enthusiastic officer may learn the nature and characters of a certain few under his command, but there are hundreds of men in every regiment who will not let themselves be known, who do not care under the present circumstances to allow their European officers to interest themselves in their lives, and these probably, strange as it may seem, will comprise the best behaved men in the corps. Of these the British officer knows nothing, further than that they are quiet and well behaved men. He has no means of knowing them, and they at present have no means of understanding the true position which every good officer would wish to hold towards the soldier under him.

Their ideas are formed from the columns of the Vernacular Press which are eagerly devoured by those who can read, and from bazaar "gup," which is but too readily listened to by all classes of our native soldiers.

The tone of the Native Press has been much commented on of late, and we know from actual facts, that sedition and rebellion has been openly preached in the Vernacular papers: that our native contemporaries have vied with each other in distorting the intentions of our Government, and of every act of our Imperial policy, and in placing our endeavours and efforts to raise the social position of the inhabitants of our Indian Empire in the worst possible light. It is unnecessary to refer to any particular case, any one can at any time by perusing some of the Vernacular papers, receive ample proof of the delight they take in placing a bad construction on every measure introduced or suggested, by both the Imperial as well as the Indian Government. Really educated natives must smile at such foolish accusations, and we are happy to say that there are many bright exceptions to the above—native papers, in which matters of policy are discussed with something like fairness. But as a rule there can be no doubt, but that the tone of the native press is such as would not be tolerated for a moment by any Government other than that which rules over the British Empire.

The gulf between the European officer and the native soldier is from natural causes very great, but this gulf is only widened when the sepoy

has such sentiments as appear in his native journals from day to day kept constantly before his eyes ; it must at least tend to destroy any good feeling which might otherwise spring up between them, if it does not really depreciate the value of the one's influence and undermine the discipline which the other owes to the Government he serves.

Attention has been drawn to the pernicious effects which bad literature has upon the uneducated, by the startling information which has lately been placed before us, that its influence on the more youthful portion of our home population is far worse than could possibly have been supposed ; that in fact a greater portion of the crimes committed in England by boys and young men, are instigated in the pages of the low cheap periodicals, which are sold in such enormous quantities throughout the metropolis. If such is the case in a country like our own, what can we expect when we have the same influence at work on an alien race and in a conquered country.

I trust I am exaggerating the effects, but I do firmly believe that they exist, and it is with a view to their mitigation, and further with a view to promoting a closer intercourse between the native soldier and his European officers, which as I have already stated is at present almost purely nominal, that I have taken pen in hand to write a few lines on the establishment of Soldiers' Institutes for our Native Indian Army.

It is with the greatest diffidence that I approach the subject. It is one that has not been noticed heretofore in the pages of this Journal, but I trust that it will now be thoroughly ventilated through this same medium and that success will eventually attend the proposal. My proposal for the establishment of Soldiers' Institutes in our Native Army must be divided into three parts:—

First.—As a preliminary measure, I would advocate the extension of our present regimental school system.

Second.—I would advocate the formation of small regimental libraries and recreation rooms.

Third.—I would suggest the establishment of a service printing press at every large station.

First.—I. The extension of our present regimental school system will be the first necessary step towards the formation of Soldiers' Institutes in the Native Army.

The great improvement in our regimental schools of late years is very noticeable. It was during his command of the Bombay Army that Lord Napier turned his attention to the subject of army education, and it was by his orders and owing to his personal encouragement that the regimental school system received such a stimulus.

It was under his instructions that girls' schools were formed in every regiment, and the lively interest which he always took in them caused them to be at least temporarily successful. But we have to deal more especially with male education.

In looking back ten years we cannot but notice that the greatest stride has been made in the study of our own language. In regiments where English was only nominally taught, that is to say, where the study of it was confined to a parrot-like knowledge of the alphabet, we now have three and four classes where it is eagerly studied. Of these the first and second would pass muster in many of our English village schools, and are alike creditable to the pupils themselves as to the officers who supervise their instruction. But, of course, the secret of this improvement lies in the fact that they look to advancement in life through a knowledge of our language.

If the pupil is a sepoy he hopes to bring himself to notice and obtain promotion as a reward for his efforts. If he is but a "line" boy, (as we call them), he knows that by a knowledge of English, he can obtain employment and earn money which he never could, did he lack such; and that it is to his advantage to study when he can do so free of expense.

Reverting to the sepoy. It is astonishing the spread of the English language amongst the commissioned and non-commissioned ranks of our native army,

Native officers now read English newspapers and take an interest in the world around them, of which they knew but little or nothing before. Company orderlies now keep their pay accounts and rolls in English, who but a few years ago hardly knew a letter of the language. And finally, English copies of the "Field Exercise" and "Rifle Instruction" now may be seen in good numbers in regiments, where a book of the sort was formerly utterly unknown, except of course amongst the European officers.

This may be said to be encouraging, and it appears that our first step should be to still further expand the course of English studies, by an increase in the number of teachers and by a grant for an increased supply of books, and occasional prizes to deserving students. This leads us on to the subject of

Second.—II. The formation of Regimental Libraries.

This is a subject which as it were, speaks for itself. The libraries in our English regiments have been of immense value. Men who before their establishment were idle and therefore troublesome fellows, are now quiet, orderly soldiers. Books have great influence on mankind, and it is but just that we should give our native soldiers as good an opportunity of improvement as their English confreres have.

Let the beginning be a small one, but it is well worthy of a test. Large numbers might not take advantage of them at first, but at least some would, and these would appreciate the benefits placed at their disposal, and we might have reason to expect that the number would shortly increase. Many natives would read if they could afford it. How many of us know, how much a book is prized amongst them. How it is handed about from family to family, from one to another, and even almost revered on account of its rarity. Such a book as the *Arabian Nights*, I have seen circulating through the lines for months together. The East we have always recognized as the land of "Story-tellers," and we know from actual experience how much the advent of one of them is hailed in a place by the natives. It is but natural—it has a parallel in our own country, for it is not so long ago that our travelling pedlars were the pets of our villages. Before steam opened up our communications, before schools were established where the lower classes could receive an education, before competition placed books and papers within the reach and means of the poorer classes, the great part of the British population was dependent on travelling pedlars for their news of the world. In those days a person who could read was looked up to as an educated man or woman. Now, one must be deeply read indeed to receive such a title.

Granted then, that the libraries in European regiments have been successful, and that the British soldier is certainly not imbued with a larger amount of natural craving after the romantic than the sepoy. Now, is it not palpably our duty to place the same advantages within the reach of the latter which the former enjoys.

I think that there can be no doubt, but that the gradual development of a Native Regimental Library system would have a most beneficial effect on the Native Army in general. I would suggest that, at first the larger proportion, say, three quarters, should be story books in the native languages, and that if such are not obtainable, translations should be made into the languages usually known amongst our native soldiers: that these books should consist of original native works, and translations of standard English or other European books. Further, that the native officers, N. C. O. and soldiers be charged some small, almost nominal sum for permission to make use of the Regimental Library and Recreation Room, say, one anna a month. As it may appear strange, that I should have suggested such an apparent anomaly as introducing a system and then asking the recipients to pay for the advantage, doubtful as some even may consider it, I would explain that as far as my experience of native character has given me an insight into their thoughts and ideas, with regard to all innovations carried out by the British Government either in the Army or out of it, I have found that many things which have been placed within their reach for their own sole benefit, have been neglected and shunned, whilst others, for which they have had to pay, have been in some cases eagerly sought after. The fact is, they value a thing according to the price asked for it. Of course I refer entirely to an innovation, the benefits of

which they do not thoroughly understand. I believe I am not wrong when I say that the introduction of our present great system of irrigation is apropos of the question in point. In many places or districts where the charge for water was nearly nominal, the ryots or at least the greater portion of them refused to take it, or demurred against the charge; whereas in other provinces, in which the authorities had the boldness to fix a high rate on the supply, it was eagerly demanded by the husbandmen along the canal route.

But, the charge for the regimental library is a matter of detail which we need not enter into at present.

RECREATION ROOMS.

Now, coming to the more general question of the establishment of Soldiers' Institutes in our native regiments, it must be candidly owned that there is much to be said against any present prospect of their success, whatever the ultimate result may be.

It will be said by many and with a certain amount of justice, that Jack Sepoy would care more for a rupee a month extra pay than for all the books and games which you could place at his disposal.

Again, it will be said that our soldiers are an indolent race, that when their regular duties are over for the day, eating and sleeping form the chief occupation of their leisure hours.

Quite true, but we must not be daunted.

Our native sappers and miners are a proof of how much the sepoy improves both in intelligence and stamina by having lots of work to do. My experience of Sappers has not been extensive, but during the two years I had the honor of serving with them I had some opportunity of judging of the effect of a more intelligent training on the sepoy. I found a large proportion of them eager to learn and to teach others what they had already mastered, and could not help noticing that as a rule they were far in advance of their brothers in the Infantry both in physique and mental power.

The success of our regimental gymnasiums should offer us a little encouragement. All of us Indian officers know how the men delight in the "Talim Khanas." Natives are very fond of games of skill. Chess is played much more commonly than is generally supposed, whilst card playing is rife in many regiments where the existence of gambling is not suspected.

The native soldier is left very much to himself, and having no general meeting house he goes to his friend's hut, and there, being to a certain extent free from detection, he will gratify his taste for play.

We might hope by placing a room and various games at his disposal, and strictly prohibiting gambling, to gradually wean him from this craving after secret play.

At all events, if we do not succeed with the old and inveterate gamesters, we might have ample scope for introducing a higher moral tone amongst those, a by no means small proportion, of our sepoy's who are mere lookers on at games of chance.

I would propose then, that in connection with the regimental library there should be a recreation room, supplied with different games both native and English, such as chess, backgammon, cards, &c., That in connection with the recreation room a supply of out-door games should be kept up for the use of the regiment. No one can have travelled much of late years in India, without having noticed how wonderfully the natives have taken to our manly European games. In native regiments, both Cavalry and Infantry, this progress is even more noticeable, and I have played both with and against elevens composed of native soldiers, who would gain applause from the public at Lords or The Oval.

Young native soldiers I have known, who have excelled their teachers—University men—in our national game of cricket—and to play with whom it was a real pleasure.

I have frequently seen young sepoy's after a few week's training stand up before the wickets against swift bowling, and that without pads or gloves, in a style which would have done the heart of any old English pater familias good to have seen. In the hot season in some of the hottest stations of India, I have played foot ball with native soldiers and enjoyed their evident eagerness after the game, which is supposed to be so entirely suited to a cold climate. But who were the prime movers in these cases—who the promoters of this social intercourse? Why, the commanding officers of the regiments of course. No one who has seen such scenes as these, but would feel a certain degree of sanguineness in the ultimate success of Soldiers' Institutes in our Native Army. If there exists any real doubt on this subject, it might easily be cleared up by circulating this proposal throughout the Native Army and asking for the individual experience of commandants and senior officers. It may be that I have been more than usually fortunate during my short service, but I cannot help feeling that there are very many who would bear me out in the statements I have made regarding the general aptitude of natives for our English games, and their evident liking for them whenever they are placed within their reach.

Regimental officers would in most cases keep up the necessary paraphernalia, but it would be a graceful act on the part of Government if they supplied at least the first set of games to all regiments in connection with the library and recreation rooms.

Individual officers have already sown the seed, and it now only requires Government to give the necessary stimulus for it to germinate and bear good fruit. As has been proved of late years in our home universities, physical must go hand in hand with mental culture; and therefore in attempting to draw up a system of education for our native

soldiers we must bear these two points in view. We have been told that we should not attempt to educate our native soldiers too highly for political reasons. It can only be said in answer to this, are we thoroughly satisfied with the discipline of our native army, and when I say discipline, I refer more particularly to the feeling existing between the European officers and the Native ranks below them, upon which discipline so much depends? . If not, then the only thing on which we can depend is physical and mental culture.

The more interest you create the higher tone you will obtain. The more the intercourse between the English officer and the native is enlarged and encouraged, the more satisfactory will be the results both regimentally and to the service in general.

Should it be contemplated, with a view to obtaining a higher class of soldiers, to slightly increase the pay of all ranks, we could not wish for a more auspicious time for the introduction of Institutes into our Native Army. Throughout India the subject of social intercourse between Europeans and natives is being warmly taken up, and it is said that an institution is to be founded in Calcutta for its promotion. Now, though much immediate success may not attend this preliminary movement, still it is a step in the right direction and should be an encouragement to us to found similar institutions throughout the Native Service. We now come to the third division of my proposal, viz.

III. The establishment of Printing Presses, (service) at all *large stations*.

In the commencement of this paper I referred to the evil effects of bad literature on uneducated minds. It is with the view of mitigating such evil that I would propose the establishment of central Government Presses, from which should be issued journals to the Native Army in general. I would propose that a European officer should with a native commissioned officer as subordinate superintend each press: that the matter should be supplied by officers and men of both services: that officers and men should be encouraged to write original papers, or furnish translations of standard subjects: that the papers should be printed in English and Hindustani and other languages, such as Marathi, Guzerathi, Hindi, Punjaubi, etc., according to the locality in which the press is situated: every article furnished by a native commissioned, non-commissioned officer or soldier to bear his name, rank and regiment in full, and be published with it: that the paper be called "The Indian Army Journal:" and lastly, that a copy of each be furnished by each press to every native regiment or corps throughout India. We may hope by these means not only to counteract the evil and pernicious effects of the tone of the Vernacular Press, but also to generate a higher and purer literature amongst our native soldiers.

There can be no moral doubt but that a very much higher feeling of respect would exist between the sepoy and his European officer, were the former's mind not poisoned by the foul and indiscriminate

though to the educated, ludicrous accusations against the British government which it is the habit of native editors to supply for their own countrymen's edification, and which is so largely circulated amongst the rank and file of our native army.

When from day to day we read the same statements of tyranny and oppression : when we continually have kept before our eyes the same tales of bad government and bad policy, we must be highly educated and deeply versed, and experienced in the subject before us, not to become in some degree, however slight, biassed, and influenced thereby for the worst in our actions. Therefore, bearing this in mind we may say, without making any reckless statements, that the tone of the Native Press has had far from a beneficial or wholesome effect on our native soldiery.

The establishment of a press at each of our principal stations would not be a costly experiment, either as a first outlay or to keep up ; for the quantity of printed forms required now-a-days by each regiment and corps in the service is so large as to call forth all the energies of private establishments to fulfil the contracts given to them, and it may not be premature to suppose that a larger portion of this work could be more easily and cheaply carried out by establishments such as proposed for the printing of the Indian Army Journal.

Very many of our European regiments have their own private presses, and I believe they quite pay their own expenses if not the first outlay.

I would suggest that all the hands employed in these central presses be native non-commissioned officers and men ; who would receive some small staff pay, such as a company orderly gets. Sepoys are very fond of such positions, and if such presses were introduced, there is no doubt but that they would become very popular with all ranks, and that situations in the offices connected with their working would be eagerly sought after. Even if the establishment of central presses at large stations be not carried out, one at each of the Presidency towns might be established as a preliminary test of the advantages to be gained by the printing of and circulating a service journal throughout the native army.

SUMMING UP.

At present there is little more to be said. We require more statistics and more experience. I have made the foregoing proposals with the greatest diffidence, and I can only now trust that others who are more capable of doing justice to it than I am, will come forward and favour the military world with their ideas on this, I may venture to say, very important subject through the medium of the pages of this Journal.

These few notes have been hastily compiled, as the present time seems to be particularly suitable for the promulgation of the matter before us.

soldiers we must bear these two points in view. We should not attempt to educate our native for political reasons. It can only be said in answer roughly satisfied with the discipline of our native discipline, I refer more particularly to the few European officers and the Native ranks by which discipline so much depends? . If not, then the depend is physical and mental culture.

The more interest you create the more the intercourse between the European and Native enlarged and encouraged, the more the discipline regimentally and to the service in general.

Should it be contemplated, of soldiers, to slightly increase the number of a more auspicious time for the Army. Throughout India the intercourse between Europeans and natives is being improved, and the discipline is to be founded in the future on immediate success may not be a step in the right direction. I have found similar institutions in the East, but they come to the third division, and they are singular in that.

III. The establishment of a large number of cases excellent stations.

In the command which the British soldier enjoys we need, not fear the bad literature which will be imperceptible at first; but we must persevere such evil that some success must attend our efforts to raise the tone of his Presses, from general character.

At a short time the Indian Armies will lose their present Commanders-in-Chief, a Chief who has always taken a deep interest in the material of the army schools and libraries, and the general welfare of the soldiers that command European, under his command. Will it be considered as or further the latitude allowed in the pages of this Journal, if it is suggested that it would be a very graceful as well as welcome farewell to Lord Napier of Magdala issued instructions for the foundation of Soldiers' Institutes for the Indian Native Army in commemoration of the visit of H. R. H. The Prince of Wales to our Empire of Hindustan, before finally retiring from the command of the Indian Forces.

R. HENNELL, *Captain.*

Bombay Army.

LONDON, December 1876.

NOTE.— Since writing this paper, I notice that the Anglo-Indian Press have advocated the establishment of an Official Journal for much the same reason as adduced in the above.

II.

THE ENGLISH SOLDIER IN INDIA.

I. H. EVATT,

Department.

...ing some aspects of
 ...to its applicability
 India. We propose to
 ...are likely to ensue from the
 ...to the English Army stationed
 ...to contribute some individual views
 ...opinion on this subject. No question
 ...so rapidly coming to the front as this one.
 ...enlisted for six years under Lord Cardwell's
 ...for their period of service with the colors,
 ...able at this time to examine how a Short Service,
 ...is likely to affect England in her imperial position
 army.

...question of such deep importance, and so wide in its bearings
 ...must be discussed in a wide and liberal-minded spirit. We
 ...discuss it firstly in its English Imperial aspect, as to how it
 ...affects the mother country. Secondly, in its Indian aspect as concern-
 ...ing the Indian Government, the question of expense to the Indian
 ...revenues, and its general applicability to this country. Thirdly, as
 ...to how it would affect the military efficiency of our Home Army, and
 ...of our garrison in India. And fourthly, in its medical aspect as con-
 ...cerning the personal health, and well-being of the individual soldier.
 Any settlement or attempt at settlement of this question that is not
 based upon a just valuation of each of these aspects will certainly
 fail, and we may rest assured that unless the decision is thoroughly
 in accordance with modern ideas it will be quite useless. We cannot
 stem the current of modern ideas, the true aim should be to divert
 that current as best we can to do the work we want done.

3. In any consideration of this question of the service of the
 British Soldier in India we may lay it down as a first principle, that
 any attempt to revert to the system of a Local European Army in this
 country is quite out of the question. We take it for granted that the
 English Soldier is in future to be a wholly Imperial servant, and that
 all questions referring to the Army will be dealt with from an Imperial
 point of view. Without entering more fully into the invidious question
 of the efficiency of the old Company's European regiments in India
 we may conclude that the step taken in 1860 of abolishing the Loca

In conclusion it becomes more than ever necessary under the present organization, that the intercourse between European and native officers and rank and file should be enlarged as much as possible. Now that there are so few officers with a regiment, and those few are being so frequently changed, the gulf between them becomes more difficult to bridge over day by day. Many officers of great energy make the study of the characters of the officers and men under them their great object, but as a rule, the feeling is, that one is here to-day and there to-morrow, and it is a hopeless and unsatisfactory task, and the promising and unpromising are left unnoticed together.

The native soldier is a strange fellow, and takes a great deal of knowing. As has already been said, some will never allow themselves to be known. But as a rule the sepoy—for of course Native officers and N. C. O. are naturally brought more prominently to notice, is a man who is very partial to an interest being shewn in him. He will not as a rule—though there are many very unpleasant exceptions in every corps—push himself forward. A kind word goes a long way with him. He will smarten up when encouragingly spoken to, will take advice from his company or wing officer, it may be from interested motives, (but with these we have not to deal—) and become quite a different character it looked after. They all have their pursuits, but from their natural apathy, unless their European officers interest themselves in them, they lead an idle life—not that they are singular in that.

In the native soldier we have in a large number of cases excellent material to work upon, and I sincerely believe that if we give the same advantages which the British soldier enjoys we need, not fear the result. The change will be imperceptible at first; but we must persevere and some success must attend our efforts to raise the tone of his life and character.

In a short time the Indian Armies will lose their present Commander-in-Chief, a Chief who has always taken a deep interest in the subject of army schools and libraries, and the general welfare of the soldiers native and European, under his command. Will it be considered as exceeding the latitude allowed in the pages of this Journal, if it is suggested that it would be a very graceful as well as welcome farewell act, if Lord Napier of Magdala issued instructions for the foundation of Soldiers' Institutes for the Indian Native Army in commemoration of the visit of H. R. H. The Prince of Wales to our Empire of Hindustan, before finally retiring from the command of the Indian Forces.

R. HENNELL, *Captain.*

Bombay Army.

LONDON, *December 1876.*

NOTE.—Since writing this paper, I notice that the Anglo-Indian Press have advocated the establishment of an Official Journal for much the same reason as adduced in the above.

II.

SHORT SERVICE FOR THE ENGLISH SOLDIER IN INDIA.

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INTRODUCTION.

1. We purpose in the pages that follow, discussing some aspects of the short service question with special reference to its applicability or the reverse to the Imperial Garrison in India. We propose to enquire whether advantages or drawbacks are likely to ensue from the application of short service soldiering to the English Army stationed in this portion of the empire, and to contribute some individual views towards the formation of a public opinion on this subject. No question that we are cognizant of is so rapidly coming to the front as this one. In a year or two the soldiers enlisted for six years under Lord Cardwell's Act will be time-expired for their period of service with the colors, and it seems advisable at this time to examine how a Short Service, system for India, is likely to affect England in her imperial position India, and the army.

2. A question of such deep importance, and so wide in its bearings as this, must be discussed in a wide and liberal-minded spirit. We must discuss it firstly in its English Imperial aspect, as to how it affects the mother country. Secondly, in its Indian aspect as concerning the Indian Government, the question of expense to the Indian revenues, and its general applicability to this country. Thirdly, as to how it would affect the military efficiency of our Home Army, and of our garrison in India. And fourthly, in its medical aspect as concerning the personal health, and well-being of the individual soldier. Any settlement or attempt at settlement of this question that is not based upon a just valuation of each of these aspects will certainly fail, and we may rest assured that unless the decision is thoroughly in accordance with modern ideas it will be quite useless. We cannot stem the current of modern ideas, the true aim should be to divert that current as best we can to do the work we want done.

3. In any consideration of this question of the service of the British Soldier in India we may lay it down as a first principle, that any attempt to revert to the system of a Local European Army in this country is quite out of the question. We take it for granted that the English Soldier is in future to be a wholly Imperial servant, and that all questions referring to the Army will be dealt with from an Imperial point of view. Without entering more fully into the invidious question of the efficiency of the old Company's European regiments in India we may conclude that the step taken in 1860 of abolishing the Loca

European Corps in India, and followed up since in the Cape, St. Helena, Canada and Ceylon, is a sound principle, and not to be departed from. We cannot allow the English Soldier to be hired or dealt with by any local administration; he must remain part and parcel of an imperial organization, a visible sign of our imperial existence.

4. Practically, as we shall note further on, India secures by the existing long service, or coming short service system, an ample supply of intelligent subordinates from the ranks of the Imperial Battalions, to fill the petty offices of the local Indian Administrations. Without any trouble in enlisting special men, without the drawback of taking a mixture of bad and good together, as she would have to do in any general enlistment, India skims off as it were the cream of the non-commissioned officers and men of the British Army in India for her service. So long as they behave well she keeps them, the moment they misbehave she returns them to the Imperial regiments, an easy mode of getting rid of them, and one quite impossible had she regiments of her own. It is literally by such subordinates—the cream of the Queen's European regiments, that all the sub-departments in the country are carried on. The Commissariat, the Public Works Department and the Canals are ably worked by these men. They are nominally soldiers, but really military civilians, in the pay of the local administrations, employed during good behaviour, and liable at any fault to revert to their position in the rank and file of the European corps. Such a privilege granted to India more than makes up for any supposed injury she may imagine she suffers, in not having European corps of her own from whom to choose subordinates.

5. It seems fair in the commencement of this paper to state, that its general tendency will be to place in prominence the various arguments which we believe have weight in favour of the short service system. In thus taking the reader into confidence, it is but just to ask that the various arguments put forward may be considered. Short service must be considered. It is in vain laying down fine theories that cannot be carried out. Short service must be fully and fairly discussed, the opinions and the prejudices of the service notwithstanding.

6. We shall divide this question for convenience of examination into four heads, viz :—

(a) The imperial aspect of short service in India as concerning England in her imperial and military position.

(b) In its Indian aspect as concerning the Government of India, the question of expense and efficiency.

(c) In its military aspect, as to the bearing of the question on the strengthening or weakening of our military position in this country.

(d) In its medical aspect, as concerning the personal fitness of the individual soldier!

Finally it would seem necessary to discuss some changes, which the introduction of such a system would necessarily entail in the routine of Indian service.

SECTION A.

The Imperial Aspects of short service in India.

7. We believe that viewed from an Imperial point of view, nothing but good will result to England and the empire from the introduction of short service for the European Soldier in India. By short service in India we mean service under six years in this country, and averaging five years for each individual man. It is needless to point out that short service refers only to the private in the ranks, and to a small percentage of non-commissioned officers. In any Short Service Army, a backbone of long service, and thoroughly professional officers and non-commissioned officers is a *sine qua non*. This is granted in all discussions on the subject. We must by every possible means keep the sergeants on the permanent long service back-bone of the army. Good pay and good pensions can secure this without any difficulty.

8. It is further necessary to note, that in discussing this question we do not propose to relieve regiments or battalions, as such, every five years. The relief will be entirely individual. It is of much importance that the short service soldier should not come to India as one amongst 800 in a battalion all equally ignorant of India as himself, and changed every five years; what is wanted is that the permanent cadre of officers and non-commissioned officers should serve for the same term as at present, and that their private soldiers should alone come and go for five yearly periods. The change of battalions every five years would disturb the roster too constantly. It would bring out to India a crowd of soldiers, all in the same battalion, with officers and staff quite ignorant of the country, and this we do not want. The colors should remain their full ten or twelve years in India, and the individual men alone be relieved as their period of service for five years expires. All errors made in India in the way of interior economy or of climate exposure are made by new regiments just arrived in the country, in which, as often happens, no one knows the Indian routine. It takes time to learn such routine. To bring out every five years raw battalions from England is to court serious losses from ignorance of the customs of Indian service. For the sake of convenience we shall examine each point of the imperial aspects of short service in India separately.

9. (a) *The empire is benefited by the English soldier coming for a certain time to India, and taking his share of Indian service.* We have adopted short service with the colors, and handing over to the reserve afterwards, as the rule for the future in our English Military System. Doubtless there are arguments against this system, but though it means a termination to our splendidly drilled Old Soldier Army, and although it means infinitely increased work for the officer and non-commissioned officer, it assuredly means national military efficiency.

Viewed from such a stand point we may freely sacrifice much of the old perfection in parade movements that so long made our army unique in Europe. With a Short Service system then it becomes necessary to force as it were the military knowledge of the recruit. It becomes necessary to compress into five years of active duty with the colors the amount of knowledge the average soldier gained in 21 years long service under the old system. This can be easily done, and the more insight, and the more intimate knowledge we give the man of his profession in those five years, by so much is England the gainer.

10. Now nowhere better than in India can a man be taught soldiering. It has been said and with some truth in the olden time that India may be to us what Algeria was to France under the third empire. A school for lax discipline. A school for happy-go-lucky campaigning. A country for gaining decorations in, but for forgetting all real military knowledge. The liability of such results is every day passing away in India. European efficiency is every day making greater inroads upon old Indian institutions, and the luxurious campaigning of old days is now merely traditional. Properly worked, India should be the rugged nurse of the soldier. Here the English private removed from the dissipations of an English Garrison Town is thoroughly under control. Discipline grasps him with a hold from which escape by desertion is impossible. Surrounded by a population which may perhaps one day become aggressive, he feels more on the *qui vive* than he ever could be in any Home Garrison. He can see camp life most thoroughly. Long marches are the rule. He sees the Commissariat working in a far more complete way than in England. Ample leisure exists in which to study his profession, or to learn in the school. Removed from his friends and relatives, comradeship and the regimental bond becomes far closer than in England. If a man is to serve five years in the army, and then pass to the Reserve, every year he passes in India of that five, is for the reasons before mentioned, worth twice the time spent in England.

11. All we have written in these preceding lines refer to the first five years of a soldier's life in India. In these years of enthusiasm and bodily vigour the man is every day improving. Beyond that period to our mind the private soldier if still in the ranks and not a non-commissioned officer, begins to deteriorate morally and physically. He sinks into the indifferent type of Indian Soldier. He begins to be listless and used up. He has survived his enthusiasm for the new country and to enjoy the greatest ease may become his aim. He strives to get married. Such a man had far better return to England. If a man is still, at the end of five years service, a private in the ranks, he has stamped himself as a man devoid of energy unless in very rare cases. Such a man in the Barrack-room is deadly to the enthusiasm and energy of the recruit. It were far better to offer him any pension to leave the active ranks than to allow him to teach the young enthusiast that all is vanity in the military life.

12. After this period too, as we shall notice further on, the commencement of climatic deterioration sets in. Previously his diseases were those to which in any colony he might have been liable. Now commence the diseases of Indian deterioration. It is just before this period he should be returned to England, and to the Reserve there. Such a man knowing the army life, accustomed to a vigorous discipline, not too old to take up heavy labour at home, able if he choose to go home with money saved in India, is an excellent reserve soldier, but in the army ranks he would be terribly in the way. If we kept him with the colours he would demand a wife, and that alone entails innumerable drawbacks. Long service means married service. We must reduce the long service married men in the army to the fewest possible to obviate such a dead weight. The officers and the non-commissioned officers, who must be long service men, alone can be permitted to marry while in the active army. This should be a *sine qua non*.—England then is benefited by having her soldiers trained in a good school in India instead of living in a Home Garrison.

13. (b) *The Reserve at home is made more efficient than it would be without the Indian trained soldier in it.* This follows from the preceding argument.

14. (c). *The imperial spirit is fostered.* The English peasant coming out to India, and seeing there, and on the way out how great an empire his country rules, has his mind expanded to a great degree; education working hand in hand with this travelling does much for the man. Such an individual returning while still young and vigorous to England as a reserve soldier is somebody, and no doubt induces young lads to enlist.

15. (d) *Money can be saved in five years Indian service.* India must pay for her imperial garrison. They are cheap at almost any price. They represent English manhood, an article every day rising in value. The English non-commissioned officers' and privates' pay in India should be to their English pay as the pay of a Captain in India is to the pay of a Captain in England. This is the true principle. Thus paid, a stupid man who cannot hope to become a sergeant, can at any rate save money and go home after five years with a very good sum in his purse, he can rarely hope to do this if he has been serving all the time on English pay in England. Here in India he has few dissipation and almost of necessity saves money. There are besides many paid regimental appointments in this country held by private soldiers all tending to give more pay.

16. A man should be well paid in India. India secures her garrison of European troops at a cheap rate, because she pays only for healthy strong men. The moment a man breaks down, he is sent home, discharged, and becomes a dead weight on the imperial pension list. This is hardly fair; men break down from Indian exposure, and to maintain Indian state existence. Men so breaking down have a claim

on the Indian revenues. India escapes the dead-weight of a non-effective charge for broken down soldiers and Chelsea Hospital Pensions supply the man. If such be the case, then while serving in India he should be very well paid. Remembering that she escapes the pension charges India may fairly pay him well, while the soldier there serves with the colors.

17 (e) *The return of Indian invalids to England ceases.* It is necessary to explain that by Indian invalids, we mean men whose disability is traceable solely to Indian service. The great bulk of the invaliding for the first five years is such as would occur in any garrison at home or abroad. It is the invaliding of the imperial character. This first five years invaliding is very different from the invaliding of Indian deterioration that sets in about the 6th and 7th year in India. India is little to blame for the invaliding of the first five years, she is solely to blame for all after. When we say India is solely to blame, we do not say Indian climate, we mean the Indian life of the average long service soldier. The return of the Indian soldier, broken down from Indian long service to England, is an imperial loss and calamity. He is really a dead weight on the country. He is unfit for any heavy labour. He is fit only to carry parcels and letters as a commissionaire. In addition to the idle habits long service soldiering has too often taught him, actual organic disease has grasped him, and he finds himself unable to work hard. Such a man going home to England is a weakness to England. Now the invalid who breaks down in the first five years is not a weakness to England from Indian causes. He would probably break down in Woolwich as well as in Meerut or Lucknow. He is unfit perhaps for a soldier hereafter, but he is quite fit for civil life. Not so the long service Indian invalid. He is unfit for either soldier or civilian. He is hopelessly broken down. We avoid producing this man by having short Indian service. We return him home before Indian constitutional deterioration properly so called, sets in. We can send the man home fit for active labour, able to work at a trade. Not too old, not wedded to the diligent idleness of the long service private soldiers' life and on this account we say England would gain by short Indian service.

18. (f) *No married soldiers in India. No waste of English lives.* The more we examine the married private soldier as an army institution, the more terrible a dead-weight he seems while serving with the colors. If we keep men 21 years with the colors, we must let them marry. That goes without saying. Now nowhere more than in India is the married private soldier a thorough anachronism. He is wholly out of place. It is a down right waste of English life to let him exist in the country at all. As a necessary *sequela* of our long service soldiering system, we are year by year in India sacrificing hundreds of English children who cannot possibly be preserved. Fancy a Regiment of Infantry with 100 married women and 150 children moving in the rear of the column. What a terrible dead-weight. The moment a

regiment under long service rule, gets under orders for India, the men, often stationed in some garrison town, get permission to marry literally by dozens. Selection in such cases is not very marked—the man marries the first passable girl who will take him. Let us follow his career. He and his wife, and his married comrades occupy one-sixth of the troop-ship in its best and airiest place. A hospital is provided on board for his sick wife and children. Medical comforts on an expensive and liberal scale are carried for her. Scarletina and measles are liable to be carried into the ship by the children, and it spreads amongst the fighting men. They arrive at Bombay. One-fourth of the train is taken up by the married privates' wives and children and their luggage. They arrive at Deolalee. Large married barracks are built specially for them. They come on the Indian Government pay list of Rs. 8 per woman and Rs. 2-8 per child. They again fill the train and encumber the march in going to the regimental station. Women and children perish in a terrible percentage year by year in this country. Every epidemic disease fastens first upon them. Large tracts of cantonments are built upon to provide barracks for them. Special hospitals are provided for them and special nurses. The school master, who ought to be teaching the rank and file, is teaching their children. A mutiny occurs, they form a mass of unprotected women, or one-fourth of the fighting men are withdrawn from the field to defend them in a cantonment. A Camp of Exercise takes place; one-fifth of the regiment is to remain behind, being married. A campaign beyond the seas takes place; form a *dépôt* for the married women. They get sick, and a special shore of hill sanatoria is set apart for them. Now, if the married private is to exist, his wife and children deserve all this and more. If we bring them to India we must care for them tenderly. But why bring them? The married private is really an encumbrance in the service. If he is killed, a helpless widow and children fall on the country for support. Would it not be better then to have short service men, who cannot possibly marry, and let the permanent *cadre* alone be married. With twenty-five married sergeants and some married officers, not much injury is done to efficiency, but add on sixty married privates, and it becomes a really crying evil. It was the necessary result of an old-soldier army, but is it necessary to-day? Certainly not; if we introduce short service into this country. The death rate of the English women and children of the rank and file of the army is very dreadful, and by refusing to allow the long service married man to come to India, England imperially must be considered as a gainer. In ten years between 1860-69, 1,180 women and 4,000 soldiers' children died in India. (Vital Statistics Bengal Presidency, tables CLXXVI and CLXXVII, Bryden.)

SECTION B.

Indian Aspects of Short Service.

19. We now turn to the Indian aspects of the question, having in the preceding section, noted the imperial advantages. At first sight it

seems impossible to say anything to combat the idea of expense in relief, always supposed to attend a short service system. This, however, has to be considered very fully. But in the very outset we may state that the duty of India is to pay for her garrison. Having no European force of her own to enlist at home, no mixture of good and bad bargains to accept as soldiers, able to take the cream of the British Imperial regiments for her sub-departments, with no heavy pension list which would certainly exist had she European levies of her own, India can well afford to pay heavily for reliefs. But we shall show easily that she can save money by this short service system in many directions, and this money can be employed in defraying transfer charges. But it is of paramount importance to state our belief that very rarely any question of Indian expense should be permitted to interfere with direct Imperial advantage.

20. *India would secure young active soldiers.* By this system of short service, India would receive young enthusiastic men in the prime of youth, from twenty to twenty-five years of age. The old soldier class, that is, the class over seven years' service, would no longer form a part of the rank and file of the army. If a man wanted to remain in India, he should qualify himself for the non-commissioned grades. In the ages under twenty-five years a man is full of enthusiasm and vigour, able to endure fatigue, and desirous of distinction. After thirty years of age the soldier dies off rapidly in India. For a man over thirty years of age to come to India as a private soldier is quite useless. He will certainly die in the field. This was proved very thoroughly by the sickness of the 6th and 73rd Regiments during the Mutiny.

21. *Any man permitted to remain after five years' service would be thoroughly good.* By laying down the rule that no private soldier was to remain in India after five years' service, unless on certain conditions, an immense impetus would be given to many men, who would desire to remain in the country. These conditions should be, that of being sergeants in the regiment, having passed into Roorkee and the military sub-departments, having passed the lower standard, having so much money amassed in the savings bank, and such like regulations. Soldiers will, many of them, like to remain in India. If they desire it, it should be a boon to be gained by special service as above. By such a system, India would strain out, and keep in India, the cream in intelligence and conduct of her European garrison, and those who were either so careless or so dull as to be unqualified in the ways we have laid down would be returned to England. We do not need in India the slothful, listless stamp of soldier. Above all things we do not need the married private of long service. If India enlisted men direct for a Local Army, she would be infinitely worse off than she now is, in the way of absence of efficiency and increase of expense. In the first place she would have to offer high pay and pension, further she would have to take the good and bad recruit according as he enlisted, but now she takes only the intelligent Sergeant of the Queen's Troops. She would have to allow her private soldier to marry, because they would certainly have to be long service men, and a heavy pension list would also exist.

22. *New ideas from England.* By the interchange of officers and men from England, India is kept up to European ideas in weapons, equipment, and modern military ideas. England no doubt benefits in return by the interchange with India, as we know that many military improvements came from the Local Indian Service.

23. *Question of cost.* The existing rule of battalions remaining out ten to twelve years need not be changed. On the contrary it would be hopeless to attempt to relieve battalions as such every five years. We do not want to bring out to India a crowd of officers and soldiers, all in the same corps together, and all equally ignorant of the country. We want the reliefs to be wholly individual reliefs. Let the battalion vacancies be filled up by recruits from England, but let the recruit join in India a battalion that knows the country and its ways. Two hundred men thus arriving out each year do not disturb the tenor of regimental life, but soon find their places divided amongst eight companies in a battalion. But great confusion and disorder would reign if every fifth year one-fifth of the battalions in India were to go home and one-fifth from England arrive out. By causing the relief to be individual all such confusion is averted. Now, with reference to cost, it is necessary to record that India would save immensely by abolishing the married private, the *incubus* of long service soldiering. She would save thus : (a) by having the married quarters in the troopships available for soldiers, as the sergeants would alone be married ; (b) by having no train accommodation necessary in India ; (c) by almost complete abolition of married quarters in cantonments ; (d) by abolition of regimental female hospitals, one per station being ample for the few sergeants' wives and children ; (e) by abolishing the family grant, averaging Rs. 10 per married family in payment, in addition to the cost of quarters ; (f) abolition of the Lawrence Asylums, except for Eurasian children. The married privates' children would be drafted from India.

24. *Efficiency of her Garrisons.* The married soldier, reduced or removed to a minimum, we should be able to bring into the field nearly every man in a battalion. To-day when a campaign occurs, one-sixth of the men are kept back to guard the married women. India would gain then in efficiency by having every man available in case of a campaign.

SECTION C.

Military Aspects of the question.

25. When looked at from the military point of view the following aspects present themselves :—

(a). Good reserves of men accustomed to field work, accustomed to marching, and full of regimental spirit, are formed in England. These men would be a back-bone of strength to the Reserves in the day of trial.

(b). Discipline can be very exact in India, far more so than in England, where desertion is so much the rule. England therefore, in a

military aspect, would gain by sending her young soldiers out here. The hold of the officer over the soldier is far greater in India than at home, and this is an advantage.

(c). The English soldier deteriorates in India as a fighting man, if he remains more than five years out in a private's grade. If, before the end of his five years' service, he has not risen to a sergeant's rank, or has not passed the lower standard examination in Hindustani, or passed the examination into the Roorkee Engineering College, or has not shown himself specially useful and handy in some regimental employment, it is far better to send him home to England and the Reserve. After five years' service, more or less, the relaxing effects of the Indian climate begin to tell upon a man's constitution and habits. If he be active and energetic enough to struggle against this tendency, he may conquer it. If, on the contrary, he is careless and listless he may sink, as many old soldiers do, into a useless and idle being, who is a bad element in any barrack room. Such a man had far better be returned to England. There hard work and an invigorating climate may again waken up life in him, but to keep him in India is to encourage him in becoming a drunkard. All medical evidence too goes to prove that a soldier after thirty years of age, and still doing duty as a private, exposed to sentry duty, and the wear and tear of a soldier's life, soon ages and becomes debilitated. Such men are useless for field service, and once stricken with disease never rally. Young men on the contrary, even if attacked with sickness, have the power of rallying and often recover. The period of active degeneration in India from a physical point of view is after the seventh year, but a certain way to avoid it is by returning the men who don't suit the Indian climate after they have been five years in India. There is a lazy idle stamp of old soldier seen in every Indian barrack room. He is the bad element there. He knows where liquor can be purchased surreptitiously. He teaches the young soldier to grumble at all fatigue duties. He is the leader of complaints in all times and places. Such a man is useless; and worse than useless; he makes other men bad. To get rid of him into the Reserve is often a great boon.

26 (d). *We secure the enthusiastic young man as a soldier.* The soldiering life is one of terrible monotony in peace time. Routine holds the English soldier in a grasp of the strongest kind. Perpetual parade and barrack square drills, continued for years, soon kill all interest in soldiering. What we want is to secure a stream of young men in the days of their enthusiasm, and work them hard during the few years when enthusiasm exists. After it begins to pass away and monotony is settling down upon the man we must get rid of him to the reserve, if we would save our recruits from being injured by him. With young men properly handled by good officers any amount of work can be got through, and in the ranks of civil life the reserve soldier will be compelled to labour until the day when any mobilization of the forces calls him to his place in the active battalions. By careful training and continual teaching, such as must be introduced to make the short service soldier a good one, we will make of the young man in five years an

infinitely better being than 21 years of busy idleness did for the old stamp of English soldier. These old soldiers turned adrift at 40 years of age with a small pension, accustomed to idleness, unacquainted with any trade, so enfeebled by long service as to be unable to take up any hard labour employment, accustomed for twenty years to be cared for like children; such men are encumbrances to any nation, because they are unable to help themselves. Crowds of such men are to be seen in every city in England, striving to earn a living by carrying letters and such like labour. Such men will no longer be seen if short service gains the day. If a man remains 21 years in the service, he can only do so by becoming a sergeant early in life, and an ample pension should be his reward. The short service soldier will be returned to civil life thoroughly awakened up, while vigorous and strong, not enervated by prolonged barrack life, and unaccustomed to the idleness of the old soldier. In civil life, helped on by his retaining pay, he can make his way in a trade far better than an old soldier of 40 could, and hence the country gains. But the army gains most of all. It secures young men for the active battalions. For such youths, no amount of teaching can be too much. They can be taught everything appertaining to their calling, and the army with young men in it can become a great school for the education of the adult male population.

27 (e). *Advantages in having no married private soldiers.* The married private soldier is thoroughly an incumbrance; by getting rid of such a being military efficiency is promoted to a great degree with a short service system. Instead of having 100 married women in a battalion, 25 will be about the limit, and they will be the wives of the sergeants, who alone will be permitted to marry. When a man who is a private soldier desires to marry, he must at once join the reserve. In India the married soldier is greatly in the way. His wife and family require protection in time of war, and by doing so withdraw fighting men from important duties in the field. Sickness which haunts the married quarters, and there first of all discovers the weak points of sanitary conditions, will be much diminished by the abolition of the married private. The school, instead of being filled up by soldiers, is now filled by soldiers' children, and the schoolmaster, whose real duty is, instructing the rank and file, is wholly employed with the soldiers' children. Making every allowances for married sergeants and such like cases, the system of unmarried privates will bring at least 4,000 extra soldiers into the field in the Indian army alone.

28 (f). *If soldiers desire to serve in India demand of them special qualities in return.* Let us remember that if soldiers desire to continue serving in India it is a boon that cannot be granted without demanding something in return. Let us keep the permission to remain in India as the reward for special labour in certain directions. Thus we have in hand a fillip to study and to attention to duty. Let us say no man shall remain in India who has not a 1st class certificate in education, or who has not passed in the Hindustani language, or who is not a non-commissioned officer. By thus keeping the boon of Indian

military aspect, would gain by sending her young soldiers out here. The hold of the officer over the soldier is far greater in India than at home, and this is an advantage.

(c). The English soldier deteriorates in India as a fighting man, if he remains more than five years out in a private's grade. If, before the end of his five years' service, he has not risen to a sergeant's rank, or has not passed the lower standard examination in Hindustani, or passed the examination into the Roorkee Engineering College, or has not shown himself specially useful and handy in some regimental employment, it is far better to send him home to England and the Reserve. After five years' service, more or less, the relaxing effects of the Indian climate begin to tell upon a man's constitution and habits. If he be active and energetic enough to struggle against this tendency, he may conquer it. If, on the contrary, he is careless and listless he may sink, as many old soldiers do, into a useless and idle being, who is a bad element in any barrack room. Such a man had far better be returned to England. There hard work and an invigorating climate may again waken up life in him, but to keep him in India is to encourage him in becoming a drunkard. All medical evidence too goes to prove that a soldier after thirty years of age, and still doing duty as a private, exposed to sentry duty, and the wear and tear of a soldier's life, soon ages and becomes debilitated. Such men are useless for field service, and once stricken with disease never rally. Young men on the contrary, even if attacked with sickness, have the power of rallying and often recover. The period of active degeneration in India from a physical point of view is after the seventh year, but a certain way to avoid it is by returning the men who don't suit the Indian climate after they have been five years in India. There is a lazy idle stamp of old soldier seen in every Indian barrack room. He is the bad element there. He knows where liquor can be purchased surreptitiously. He teaches the young soldier to grumble at all fatigue duties. He is the leader of complaints in all times and places. Such a man is useless; and worse than useless; he makes other men bad. To get rid of him into the Reserve is often a great boon.

26 (d). *We secure the enthusiastic young man as a soldier.* The soldiering life is one of terrible monotony in peace time. Routine holds the English soldier in a grasp of the strongest kind. Perpetual parade and barrack square drills, continued for years, soon kill all interest in soldiering. What we want is to secure a stream of young men in the days of their enthusiasm, and work them hard during the few years when enthusiasm exists. After it begins to pass away and monotony is settling down upon the man we must get rid of him to the reserve, if we would save our recruits from being injured by him. With young men properly handled by good officers any amount of work can be got through, and in the ranks of civil life the reserve soldier will be compelled to labour until the day when any mobilization of the forces calls him to his place in the active battalions. By careful training and continual teaching, such as must be introduced to make the short service soldier a good one, we will make of the young man in five years an

infinitely better being than 21 years of busy idleness did for the old stamp of English soldier. These old soldiers turned adrift at 40 years of age with a small pension, accustomed to idleness, unacquainted with any trade, so enfeebled by long service as to be unable to take up any hard labour employment, accustomed for twenty years to be cared for like children; such men are encumbrances to any nation, because they are unable to help themselves. Crowds of such men are to be seen in every city in England, striving to earn a living by carrying letters and such like labour. Such men will no longer be seen if short service gains the day. If a man remains 21 years in the service, he can only do so by becoming a sergeant early in life, and an ample pension should be his reward. The short service soldier will be returned to civil life thoroughly wakened up, while vigorous and strong, not enervated by prolonged barrack life, and unaccustomed to the idleness of the old soldier. In civil life, helped on by his retaining pay, he can make his way in a trade far better than an old soldier of 40 could, and hence the country gains. But the army gains most of all. It secures young men for the active battalions. For such youths, no amount of teaching can be too much. They can be taught everything appertaining to their calling, and the army with young men in it can become a great school for the education of the adult male population.

27 (e). *Advantages in having no married private soldiers.* The married private soldier is thoroughly an incumbrance; by getting rid of such a being military efficiency is promoted to a great degree with a short service system. Instead of having 100 married women in a battalion, 25 will be about the limit, and they will be the wives of the sergeants, who alone will be permitted to marry. When a man who is a private soldier desires to marry, he must at once join the reserve. In India the married soldier is greatly in the way. His wife and family require protection in time of war, and by doing so withdraw fighting men from important duties in the field. Sickness which haunts the married quarters, and there first of all discovers the weak points of sanitary conditions, will be much diminished by the abolition of the married private. The school, instead of being filled up by soldiers, is now filled by soldiers' children, and the schoolmaster, whose real duty is, instructing the rank and file, is wholly employed with the soldiers' children. Making every allowances for married sergeants and such like cases, the system of unmarried privates will bring at least 4,000 extra soldiers into the field in the Indian army alone.

28 (f). *If soldiers desire to serve in India demand of them special qualities in return.* Let us remember that if soldiers desire to continue serving in India it is a boon that cannot be granted without demanding something in return. Let us keep the permission to remain in India as the reward for special labour in certain directions. Thus we have in hand a fillip to study and to attention to duty. Let us say no man shall remain in India who has not a 1st class certificate in education, or who has not passed in the Hindustani language, or who is not a non-commissioned officer. By thus keeping the boon of Indian

service as a reward for certain good points in a man's service we do good to India and to the army, as we encourage hard work and study.

29 (g). *In case of war in India the men sent out from England, who had previously served in the country, would be better able to stand the climate.* Dr. Bryden says, "Vital Statistics, Bengal Presidency. Sickness and Mortality, European Troops." Report I, Section III, Page 35: "The old soldier landed in India dies or is invalided, and the old soldiers are the men above thirty." During the mutiny war of 1857-8 the old men of the 6th and 73rd Regiments in particular suffered, and the 6th Regiment in particular was ordered into cantonments, the Commander-in-chief fearing it would be rendered useless for service by the death-rate. Advantages in a military point of view would be gained by the reinforcements coming out from England having previously served in India and been more or less accustomed to the country.

SECTION D.

Medical Aspects of the question.

30. The medical aspects of the short service system for the European Soldier in India are most important. If it be found that young men stand the climate well, rally better from severe diseases, have more elasticity of constitution, and suffer less from diseases of Indian deterioration, it will be a great point gained. If, on the contrary, it is found that long service soldiers are better men, stand the climate more easily, do not sink under attacks of disease, and do not deteriorate in this country, such results would be arguments against short service systems, and would have to be dealt with.

31. Now, in all questions concerning the English Soldier's physical fitness in India it is necessary to remember that what would be called a vigorous young man in England would, in the ranks of a Battalion in India, be considered an old soldier. Such is the wear and tear of an average long service English Soldier's life, such the bad effects of varying climates, guard duties at night, a heedless, careless existence as regards food and drink, and indulgence of the passions, that a man over thirty years of age in our army, if still a private, is practically an old man, and of little use for active service in the field in India. We know from experience during the mutiny that to bring out to India soldiers of thirty years of age, who have not been before in India, is practically useless. Such men die off at once on Field Service, their constitutions being unable to adapt themselves to the exposure to the climate a private soldier's life entails. This truth is proved very clearly in Dr. Bryden's statistics of the European army in Bengal. This fact established, we know that at any rate the English Soldier for service in India must be under thirty years of age.

32. We also know that the soldier who has served in India more than 7 years without a change to England is liable to a very high death-rate and to an invaliding rate of a most startling amount. "The British soldier can withstand the effects of the Indian climate for

"a limited period only." (Bryden's statistics, page 41.) "Whatever body we may choose for illustration, the rapidity of the increase of death-rate with age is most striking. Whether under exposure, in the routine of cantonment life, or in the special conditions of the newly arrived body, the phenomenon is constant." (Bryden, page 12.) The ratio of liability to death, per 1,000 men, on the average of the six years 1865-70 was, under 20, 11 per 1,000

20, 24 = 19	"	"
25, 29 = 25	"	"
30 & up. = 43	"	"

"We have no difficulty in recognising that the young material is that best qualified to stand the climate of India." (Bryden, page 16.) And for these reasons, when young men are attacked with disease they recover, but old men die. "The death rate of 1871 shows that the death-rate for the men above thirty has been consistently double that of men below that age in each Presidency." (Bryden, page 12, Report II.)

33. The truth about the English Soldier's health in India seems to be this. If he comes out young (20) he is liable for two years to suffer from one special disease only, and that is typhoid fever. During these two years the death-rate of the young men is due almost entirely to typhoid. "Enteric (typhoid) fever is the one disease of India by which the young soldier dies." (Bryden, page 34, Report II.) Of course during these first two years young men break down from heart disease and consumption in India, as they would in England, and for these men India is not very specially to blame. The death-rate and invaliding rate of the young soldiers, apart from typhoid, is very similar to the death and invaliding rate of other stations out of India.

34. The English Soldier in India, after being three years out, emerges as it were from a stormy sea of death by typhoid and invaliding from imperial causes, into a belt of calms, which extend from the third to the seventh year. During these calm years, dying and invaliding are at a minimum. The young men who would break down, no matter where they were stationed, and the really delicate youngster have either died off from typhoid or been invalided for what we may call imperial or non-Indian causes, and as yet the actual Indian-deterioration, dying and invaliding, has not set in. During these four years the soldier, according to our present system, is at his best; he is young and active, has emerged from the weak period of his boyhood and not begun to descend the decline of his premature old age. These are the golden years of Indian soldiering.

35. But as he advances beyond the seventh year, again all is changed. He begins to decay of Indian disease properly so called. He falls a victim to heat apoplexy, liver disease and the ague fevers. And if he is badly attacked he dies, or recovers to be a wholly broken down invalid. Intemperance and climate are ravaging his constitution, and the man soon disappears. Common sense, and all observations tend to show then that a private soldier in the ranks after seven years in India

is in a bad way, and we had best be rid of him. Enthusiasm in his profession must be dead after the monotony of seven years soldiering as a private. If we wish to keep him we must let him marry, and at once he becomes an incumbrance and a weakness. What then are we to do with the private soldier ?

36. Everything seems to point to this. Keep him not more than five years in India. If he be still a private send him home to the Reserve and get a young man in his place. Officers and Sergeants are differently placed. The officer in India enjoys a most liberal leave code. Change to Europe, to the English *dépôt*, leave to the hills, all combine, with his temperate guarded life, to make him suffer less from India than the private sentinel who does his guard duty for seven or eight years. To be a sergeant is a guarantee that the man has some superior attainments over his comrades in the ranks, and it is also a proof of more careful life and less exposure on sentry duty. Consequently these two classes escape far more than the private soldier the deterioration of Indian climate exposure. When the private soldier over seven years' service is invalided he goes home to England often so broken down by tropical exposure, combined with his own want of care in personal health, that he is a drag upon the country while he lives. Too weak for any laborious trade, he strives to eke out a living by some light duties that always mean light pay as well. To prevent such occurrences it were far better in an imperial sense to snatch the private soldier away from the likelihood of contracting severe Indian disease to which, as all statistics prove, he becomes liable in an extraordinary degree after his seventh year. Thus medical and imperial theories will be wholly in accord in this idea. The man's health will be preserved and England will be saved the loss she sustains in having to pension an utterly broken down invalid.

37. If it be true, as Trochu says it is, that the fully trained recruit is the *beau idéal* of the soldier, the military aspect of the case will also be favorable. We shall escape in our barrack room the existence of the unambitious old soldier who may do incalculable injury to the zeal and enthusiasm of the young soldier of the future.

38. There is one aspect of this medical portion of the question that must be considered. It is unfortunately true that young soldiers, during their first two years in India, die in too great a proportion. They die of a heat typhoid during the hot weather. Dr. Bryden points out how terribly fatal is this fever to the young men, it being almost the sole disease of which they die. The question arises is this death-rate unavoidable ? Is there no way of escaping from such a blood tax ? Are we to go on year by year losing so many youngsters, as we do from this fever ? It is a great comfort to know that there is an easy refuge from at any rate a vast amount of this heat fever. Our system now a days with our long service soldiers is to move up an entire regiment *en masse* to the hills once during its twelve years' Indian Service and let it remain there two years. We have, in addition to these regimental

hill stations a series of convalescent depôts along the Himalayan chains to which the breaking down old soldiers are sent for change of air for a season, and into which we send likewise as many young lads from the different battalions in the plains as can be accommodated, when the sickly men are provided for. The question of keeping the young recruits out of the plains is considered to be secondary in importance to giving the sickly old soldier a place for convalescence, and the lads accordingly occupy only such spare space as may remain available.

39. Immense advantages follow even this attempt at hill locations for the youngsters. They do not in the hills die of the typhoid fever. They escape the fierce heat that predisposes to it, and in a fine climate they grow up into strong healthy soldiers. Now this attempt at protecting them is most excellent, and plainly points out the path in which we are to advance in adopting short service system to India. Foremost amongst the changes necessary by such a system will be the abolition of removing a battalion *en masse* to the hills. It will no longer be necessary. It is certainly not essential for the officers' health, as they can get ample leave, and may every third year be told off for special duty in the hill depôts quite apart from their regiments. The Sergeants and the few long service men of the battalions of the future can also go up individually for duty at the hill depôts, but the battalion as such will remain always in the plains. Why? Because if we are to have every year crowds of young lads coming out under short service rules to India, it will be necessary to move them *en masse* to the hills. The present *regimental* hill stations will have to be abolished as such, and turned into hill depôts for the accumulated drafts of each year. In these hill climates the young recruit would have to spend certainly his first year, and in special cases his second year, in the cool climate. In the hills he would go through his first and perhaps second season, and thus be carried safely through the dangerous period of his Indian service, for practically it is during these first years the young men succumb. There would be no occasion to keep the lads the whole year in the hills. The Indian cold season in the plains is excellent in every way for them. But at once the weather began to get warm they should move up to the mountains. In those hill depôts schools for training, discipline, and education would exist, and in a climate as good as that of England in summer time, every physical and mental training could be carried out. In the hills the young men would learn of India, and what steps are necessary to guard against its dangers in a climate point of view.

40. Such a system would in a battalion of 800 bayonets have about 150 to 200 men in the hills each year, and the strength of the army in the plains would be diminished by such an amount. But practically the young men would be quite as available there for any war duty, as the present battalions quartered in the hills are. Even in case of insurrection they would hold the hill territories and do for garrisoning these depôts, to which it is certain in any future outbreak, that the women and children of the European population would retire.

41. We gain in the plains the head quarters of the regiments now stationed in the hills, but we would lose the recruits and drafts stationed under the system we propose in the hills. Every man in the plains would be thoroughly efficient, there would be very few married men, there would be no shiploads of broken down invalids returning to England. Surely these are advantages worth gaining.

Conclusion.

42. From what we have said on the question in the foregoing paragraphs, it will be seen that there is a subject for enquiry and discussion. However much our idea may be in favour of the systems under which we grew up in the army, it is necessary to foresee the future, and meet the altered state of modern opinion. We cannot in England compel the citizen to join the marching battalions. We must induce him to come. This can be done now as it always has been done for years past. If he will not come for the attraction offered him let us find out what will attract him, and he will come. Long service systems in every European Army have passed away. England is now following in the same lead. We must face the question how to maintain our Indian garrison by such a system. In the paragraphs that we have written we have endeavoured to shew that short service is not so wholly impracticable an idea as some think it, and that at any rate there are some points in its favour.

FYZABAD, OUDE,
January 1876.

G. J. H. EVATT, M. D. SURGEON,
Army Medical Department.

III.

HISTORICAL SKETCH OF INFANTRY TACTICS.

BY MAJOR DODD, WING OFFICER, 6TH BOMBAY NATIVE INFANTRY.

"On the subject of tactics there is much diversity of opinion, there being scarcely any theory, however preposterous, which may not be supported by a French or German quotation on the subject."—Home's Précis of Modern Tactics.

NOTES.

The present sketch is a compilation from many writers. The principal works consulted have been Home's Précis of Modern Tactics, Tactical Deductions from the Wars of 1866 and 1870, Quarritch's Military Library, Military Essays in the "Times" and "Blackwood's Magazine," and "Quarterly Review."

C. D. J. D.

Aden, 5th April 1876.

The word Infantry is derived from a Latin word signifying boy or servant, and as during the middle ages servants on foot accompanied the knights who rode on horseback, the name "Infanteria" became that of foot-soldiers in general. For its early history, we must draw upon classical writers, and without inflicting upon the readers of this journal any learned disquisition on the subject, it will be proper to commence with an account of the organization of the Infantry of the Greeks. The unfaded photograph of daily incidents, fresh as they occurred twenty-two centuries ago, has never been given in a more stirring and graphic narrative than that in which Xenophon traces the fortune of the Greek contingent, who, with such bravery and skill, cut their way out of the depths of the Persian Empire. The retreat of the "Ten thousand" has, in a recent lecture * at the London United Service Institution, been termed a study for all time, and a paper like this cannot better be opened than with a brief description of the Greek phalanx.

The Infantry of the phalanx was on occasions of battle drawn up in two parallel and equal lines, the first sixteen deep, the second eight deep. Its strength was about 4096 men, and it was constituted so as to act in a compact mass and fall like a block on the enemy. For this purpose the offensive weapons of the men were a spear sixteen feet long and a sword, and the defensive a helmet, cuirass, steel buskins, and an oval shield on the left arm. In preparing to give or receive a charge, the ranks were

* By General Luther Vaughan.

closed, shields were locked, and the leading ranks thrust their spears to the front, thus presenting a formidable array of steel. In open order each man had about 6 feet of space, in close one and a half.

The Greek tacticians, like those of most nations, adapted their organization to the nature of the warfare and of the country they were engaged in. The phalanx was deficient in mobility and was unadapted to extended operations over broken ground, nor did its composition escape modification by the most celebrated of the Greek generals, such as Philip, or Alexander the Great. But in the days of its early formation, the most important wars were, in their details, barbarous and petty; there was no artillery more formidable than the bow and arrow, or the stone rolled down a hill, and a phalanx marching to the sound of the fife with a regular cadenced steps, was in those times a superior offensive body.

The next and most ancient formation of Infantry which merits description is that of the Roman legion, which was as pliant and mobile as the phalanx was solid and immobile, and was adapted to the genius of the Romans, who were constantly engaged in distant wars. In order of battle, the infantry of the legion was drawn up in three lines, each line consisting of ten divisions, ten deep, and each separated from the other by an interval equal to their front. Each division had a front of 12 files and consisted of 120 men, and each line of 1200 men. The divisions of the first, second and third lines were arranged like the pieces on a draught board, and this formation was followed in the ranks, each soldier having an interval of 3 feet on either side of him, all the files being placed chess wise.

The fault in this formation was, that its numerous flanks and intervals were too open to the attacks of Cavalry; and later on the legion was re-organized by the Roman generals, the division or "*Cohort*" being the tactical unit. On the new system, the legion was drawn up in three lines, the first consisting of four, and each of the other two of three divisions.

If we believe history, the Roman soldier was not only very skilful in the use of his weapons, the most formidable of which was a heavy trenchant sword, but he was expert in the art of entrenching himself. He could make forced marches of thirty miles, carrying a load of about one hundred pounds, including armour, provisions, weapons, tools, a feat not always accomplished by modern Infantry, the English Infantry soldier in heavy marching order for service only bearing 56 lbs. 12½ oz., with his clothing and 60 rounds of ammunition.* But in the later period of the Roman Empire, the physique and discipline of the Roman Infantry deteriorated with the stamina and spirit of the nation. The heavy weapons and defensive armour which, in close combat, had gained so many victories, were laid aside for lighter arms; want of discipline

* Wolseley's Soldier's Pocket Book.

followed decay in reputation, until the legion was no longer respectable as a military body.

A writer has observed, that in all history, the existence and organization of Infantry has, in its vicissitudes, been identical with not only the political and social condition of the age, but also with the progress or abeyance of science in war. The military repute of the legion in this wise was coeval with that of the Roman nation, and their general system of tactics was adopted by their successors until the battle of Tours, A. D. 732. After this date the age of chivalry, or in other words that of Cavalry, began, and the decline of Infantry as the main arm in battles, continued until about A. D. 1422, when the first appearance of fire-arms and a standing body of Infantry were almost contemporaneous. Previous to this period, Infantry, if we except some bodies of cross-bowmen or archers, were nothing but a disorganized rabble, who followed their feudal lords, and took advantage of the fall of a knight to murder him when disabled by the weight of his armour, and plunder him of all he possessed. They were despised by the mounted men at arms; indeed on one occasion, it is recorded that when some French Infantry in a battle behaved very well, they roused the anger of the Cavalry, who rode part of them down. We have no good information concerning the tactics or evolutions of Infantry employed in the days just before the introduction of fire-arms, as they were not esteemed and little or no heed was given to their discipline, and we pass to an account of those bodies of Infantry who became so celebrated after this great change in the art of warfare, with the observation that our remarks principally apply to the continental nations, and that the bulk and best class of the English Infantry had, since the Conquest, been armed with the bow, which materially assisted in gaining the battles of Cressy and Poitiers.* The Turkish Infantry long adhered to the use of the bow, even so late as the siege of Vienna † in 1529; and the only explanation of this is that, until improvements were made in loading and firing hand-guns, so slow were the ancient musketeers that it is said an archer could shoot six arrows in the same time a musketeer took to load and discharge his piece.

The Swiss Infantry in the history of the middle ages long stood first in fame and in name for their valour and discipline. The mountainous nature of their country and the poverty of the people did not admit of the employment of cavalry, and having to contend with enemies who largely used that arm, they, like the Greeks, employed the best tactical formation to repel it, such as the phalanx, and in some of their battles they are stated to have charged cavalry in this wedgelike form. To their valour and physique, as well as to their discipline, were they

* The importance of archery was recognized by William the Conqueror, who encouraged and commanded the practice of it. Up to the general introduction of hand guns, the bulk of English Infantry were Bowmen, who maintained their superiority in every battlefield in Europe

† See appendix, Jules' Fortification.

indebted for many victories, but space only permits a description of the tactical composition of their Infantry, which for many years afforded a model to other nations.

Their battalions or squares were of some depth, and from 3000 to 8000 men each. Generally they, in order of battle, were formed in three parts, a front, a support, and a reserve, the squares being arranged somewhat similar to our present "short echelon," as thus each battalion could advance or retire without disturbing the others. The men were divided into halbediers, pikemen and musketeers, and the pikes in the front ranks knelt to resist cavalry. This formation possessed the impenetrability of the "phalanx" as well as the system of supports and reserve of the "legion." But success was greatly attributable to Swiss valour and discipline. The latter was very severe, absolute silence was enforced in the ranks, and death was the punishment for a soldier quitting them without permission; and they were, it is believed, the first nation in mediæval times to draw up a military code, which was done in July 1393.*

Rivals in fame and prowess in the battle-fields of the fifteenth and sixteenth centuries, the Swiss and Spanish Infantries were often opposed with varying results. For about two hundred years, 1474. or from A. D. 1474 to A. D. 1643, the Spanish Infantry were the terror of Europe. Abstemious and accustomed to fatigue, the Spanish peasant, when converted into a soldier, was an excellent "*marcher*," and it only needed the genius of a leader like Gonsalvo de Cordova to make them truly formidable. Macaulay, in his Essays, relates how the Spanish Infantry "hewed a passage and effected an unbroken retreat in the face of the gendarmerie of De Foix and the artillery of Este."† They were the first to adopt fire-arms and to improve the clumsy arquebuse; constant Spanish wars insured their efficiency and caused improvements in their equipment and discipline. Their ordinary organization was that of regiments 3000 men strong, ‡ and divided into companies of 200 men each, commanded by a colonel. It was long before their discipline and morale deteriorated, or before they found an Infantry capable of equalling them.

From about this period to the beginning of the seventeenth century the formation of infantry was in a state of transition. Fire arms were increasing in use, but nothing had been substituted in place of the pike to enable an Infantry man to resist Cavalry. A writer has said, an arquebusier§ without a pike was like a body without arms or legs. Pikemen were therefore retained until the invention of the bayonet; and in action they stood fast, while the arquebusiers went out to take pot shots. In a crisis, the

* The making of a military code is by some first ascribed to Richard I. of England — Maisey's Military Law, p. 7.

† Macaulay's Critical and Historical Essays, art. Machiavelli.

‡ Hence called tercios.

§ Battalion, and the foundation of the present regimental system is supposed to be derived from the formation of the French Infantry into bands about this period.

latter ran behind the pikemen, who either waited for an attack or charged in a close column. The above description applies to the French Infantry of the period, which was organized into *bands* of 500 men each, and was the foundation of the modern regimental system of the Battalion.* Defensive armour was still slightly retained, notwithstanding the improvement in the explosive force of gunpowder; and thus infantry remained until the opening of the thirty years' war.

In this struggle, an entire change was, by the talent and foresight of the Swedish leaders, effected in Infantry tactics 1618 to 1648. and organization. Instead of the clumsy solid close columns of pikemen with musketeers on their flanks, which had hitherto prevailed, its ranks were reduced from ten to six, and with the extended deployment, an increased effect was given to musketry fire. The proportion of fire-arms was increased, the musket was improved and lightened, all armour except the helmet was discarded, and cartridges and the pouch were invented. Regiments for the first time were clothed in a regular uniform. The pike was shortened from eighteen to eleven feet to suit the reduced depth of ranks, and winter clothing was given to troops, which before this had usually been in the habit of suspending hostilities during the inclemency of winter.

After the close of the thirty years' war the tactics of the Swedish Infantry were the models for those of other European 1648. armies until the adoption of the bayonet in 1703 with the pike also was abandoned the old heavy musket, and Infantry was; uniformly armed with the flint firelock and socket bayonet. The armament and formation of Infantry were pretty nearly the same throughout Europe, the only difference being in the strength of the regiments. Two diagrams are given, one showing that of an Infantry battalion about 1640, or before the disuse of pikes; and another, showing the general formation of one in 1703, when those weapons were finally laid aside. During the interval of sixty-three years, memorable in history as embracing the times of Cromwell and Turenne, the value of Infantry as the main arm of battles was increasing with the improvement in projectiles, in proportion as that of Cavalry declined.

The diagrams now given may be taken as a type of all formations of the battalion at the time in all European countries. The officers were ranged according to seniority, and this vicious arrangement of separating them from their men continued until the middle of the eighteenth century. The armament and formation of Infantry in all countries were pretty nearly the same; the only difference was in the strength of regiments. In Switzerland a battalion had 4 companies of 200 men each; the Germans 8 companies of 100 men each; and in England, in the

* Arquebuses were introduced about from 1500 to 1521, and, when first invented, those possessing them were sent out to take pot shots, the first idea of the modern system of skirmishing.

Army of Cromwell, an Infantry regiment consisted of 10 companies of 120 men each.

After Maurice of Nassau and Gustavus of Sweden, the first generals who strove to improve the organization of Infantry were 1640 to 1750. Monte Cuculi and Turenne. The proportion of pike men in a regiment gradually diminished, till in 1703 they fell into disuse with the general adoption of the bayonet and flint firelock. From this date up to the commencement of the seven years' war in 1750, the dress and discipline of the foot soldier was the subject of continued attention. One very small continental state, whose contingents made for pay the campaigns of the low countries under Eugene and Marlborough, had the questionable fortune to possess a ruler, who combined the character of a miser and a military martinet. His son, the Great Frederick, perfected by war an Infantry which became the model for all his contemporaries, and may be said to be the origin of all the Infantries of Europe, as existing in the present day.

But before this there was a foreigner in the service of France, to whom the philosophy of soldiering is indebted for many innovations,—Maurice Count Saxe was the real founder 1740. of pipe-clay cleanliness as an adjunct to military discipline, and the goose-step. He first advised cutting the soldiers' hair short, numbering regiments, housing troops in barracks, and making them march in step and with closed ranks. The claims of the conqueror of Fontenoy as an organiser were in his day pre-eminent. Although a French general who had defeated an English army, he was not slow to acknowledge the worth of its Infantry, which was then about to win Plassey under Clive, and scale the heights of Abraham under Wolfe.* English Infantry regiments were then formed in three ranks, a formation which continued down to 1808. Their uniform was hose scarlet coats, blue breeches, white gaiters and a conical cap. Belts were buff, and the barrels of the firelock were not browned. The English army in the time of George II. comprised 50 regiments of the line.

As a contrast, we will quote a description of the very uncomfortable dress of the Prussian soldier of the period. A close fitting coat, cloth breeches, woollen stockings, and a hat covering a well curled and powdered head, and a stock was his full dress. He had to carry in his kit a looking glass, a curling iron, a comb, a powder bag with puff, pomade and tallow to grease his hair. He was daily obliged to grease, curl and frizzle, and to use the apparatus of a barber's shop to prepare himself for a peace parade.

Yet in armament the Prussian Infantry were superior to all other of their age. An improvement in the touch-hole of the firelock saved time by the absence of any necessity to prime, and this was also facilitated by the soldier not requiring to turn the iron ramrod in loading,

* A biographer of General Wolfe relates, he was the first officer in the English army who trained his regiment to throw out skirmishers.

as it was cylindrical throughout and equal at both ends. The heating of the barrel from quick firing was counteracted by the use of a piece of leather in the left hand, a hint for the opposers of the Henry Martini, who complain of its failing in this respect.

The exercises and evolutions of the Prussian Infantry under their King were, with some exceptions, the origin and base of all the Infantry drill at the present day. The division of a battalion into wings, wings into double companies, the successive fire of wings or companies, halted or on the march, came into the drill book from the mind of a military philosopher who, with much suffering to his nation, but at the head of his army, had defied all efforts to subdue him.

The next period in the tactical history of Infantry relates to that from the close of the seven years' war in 1757, to the general introduction of the rifled musket in all European armies about 1853-54. It may be divided again into two phases; the first, the last half of the eighteenth; the second, the first half of the present century. In the former every nation busied itself in adopting the Prussian system of tactics for its army, and made no attempt to improve upon it. An exception to this lies in the partial successes of the American riflemen over disciplined English battalions, and first taught the value of large bodies of skirmishers in a wooded and little known country. *

To the same principle, modified by Napoleon and the generals of the French Revolutionary wars, to suit the tactical organization of the French armies, do we owe that combination of column formations and skirmishers, by which so many successes were gained by them over other continental nations who usually then manoeuvred without covering their front or flanks by skirmishers. The battalion columns, led by skirmishers, routed the lines bequeathed by Frederic the Great as surely as he in his time demolished the formations which retained the tactics of Gustavus Adolphus. The English army alone retained Frederic's system of linear tactics, aiding it by a skirmisher line, which was not adopted by other continental nations until the repeated tactical successes of the French in the earlier wars of the present century had taught them the use of it.†

It should also be remembered that up to the Battle of the Alma, the English army in the days of Wellington fought few offensive battles, and in those of the Peninsula the English used lines for the defence of carefully selected positions

* The first origin of Light Infantry is supposed to date from 1742. Battalions of Light Infantry were not introduced into the French army till 1760. In 1840, the French organized ten battalions of sharp shooters on the model of the English Rifle Brigade. About 1849 the Sardinians followed their example.

† "The Austrian army had completely given up the linear tactics of Frederic the Great and had adopted the old French tactics of battalion columns at deploying intervals, covered by skirmishers. During the interval that succeeded the battle of Jena the Prussians had abandoned the linear tactics."—pp. 56 57, Home.

Excepting the introduction of the percussion lock* about 1842

and an increase of riflemen in European armies,
 • 1842. no change was made until just before the Crimean war, when the expediency of substituting the rifle for the smooth bore became apparent. At the Alma three-fourths of the British Infantry were armed with rifles, the French had certain corps so armed and the Russians very few rifles. It was the first battle fought after the general introduction of the new arm,

and as soon as it was evident that it had no equal, all
 1854. other nations absolutely adopted it for the Infantry of their armies. But the requirements of the new arm were in no way appreciated throughout Europe until the campaign of 1870 had forced their acceptance on the world. In the interim many proposals had been made for altering Infantry tactical formations, † but there was no general consensus of opinion as to the best, until German military writers explained and analysed the wars of 1866 and 1870. This is, we think, concisely summed up in these words by an English writer in "Blackwood's Magazine."

"The French, imitating the Algerian light troops, had trained their whole Infantry to move in a looser method than of old, and one therefore which all the more demanded as an essential element greater discipline and subordination; while the Germans, moving quite as loosely, and in bodies of much more mobile size, were trained to move more readily. The handy company column of the German army adapted itself to every emergency, from the general advance of a whole division at Forbach to the pettiest skirmish in Brittany." Again, at the end of the war of 1870, it was seen that much had to be learnt as regarded handling Infantry on the battle
 1870 to 1874. -field, hence the changes in drill and the various experiments which year by year have been so perseveringly made up to the present open order formation for Infantry attack on a position. ‡ It was not until after the battle of Gravelotte § and the fearful losses which even the Prussian company columns there sustained under rifle fire, it became an axiom that in extended lines lay the only hope of success in the attack.||

* The percussion lock was proposed, singular to say, by a clergyman, the Rev. Mr. Forsyth.

† In 1849 a Prussian Captain, Von Wittick, wrote a work in which he advocated the employment of Infantry on horseback, i. e., mounted Infantry; and so anticipated a more recent writer on the western side of India. The idea of making cavalry available for fighting on foot has already often been advocated in various forms.

‡ As the value of fire increased, so the formation of troops must alter, to give a greater development of fire than formerly, and greater protection to the men advancing.—Home, page 61.

§ Battle of Gravelotte.—"Only too often however these columns, both company and battalion, remained undeployed under fire, and caused those fearful losses. It was not until after Gravelotte that the necessities of the day were in any way realised."—*Times* Review, September, 24, 1875.

|| "Great clouds of skirmishers and small tactical units, that is the form for Infantry: "all idea of attacking with large compact masses is finally exploded."—Boguslanski, p. 160.

Our sketch is nigh complete ; we have attempted to describe the formations of Infantry from the earliest known periods to the present. What future changes may occur cannot be predicted, but they seem to point to an increase in the power of the foot soldier by an improvement in the range, accuracy and rapidity of fire of the military rifle. At the beginning of the present century Artillery could dash up and unlimber within 300 yards of an Infantry square, with the certainty of decimating it without loss ; forty years later, the distance was increased to 500 yards ; now it must be raised to at least 900 or 800 yards, and the time will soon come when Infantry will be king at a perhaps greater range than that.

C. D. J. DODD.

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IV.

PROPOSED PLAN FOR GIVING INCREASED EFFICIENCY
AND GREATER MOBILITY TO A M. L. R. 9 POUNDER
FIELD BATTERY—(*Concluded.*)

BY MAJOR W. B. E. ELLIS, R. A.

When any innovation or supposed improvement is brought forward, the first thing that is apt to be said about it is "there is nothing new in it," or something of that sort. Well, we all know the trite old saying that "there is nothing new under the sun," and in the particular case of this limber there never was any pretence at perfect originality, though the idea of trying some plan of the kind had been long since in the writer's mind. In Major Duncan's valuable History of the Royal Artillery, Vol. II., page 117, we find extracts from the MS. Narrative of Brigadier General Lawson, R. A., who commanded the Royal Artillery of the Expedition to Egypt under Sir Ralph Abercrombie in 1801, and a more instructive narrative of the practical working of Artillery in the Field will scarcely anywhere be found. Here we have an instance of an officer landing in the face of the enemy in a difficult and almost desert country, and there and then almost completely re-organising and changing the system of equipment he found to hand, and with which, had he left it unaltered, he would probably have stuck fast in the first march he attempted across the sands and canals of Egypt. In Brigadier General Lawson's narrative, we read as follows :—

"The ammunition for field service was usually conveyed on camels' backs, each carrying four of the altered 6 pr. packing cases, two on each side, in a sort of netted bag thrown over a pack saddle; but useful as these animals are generally for great weights, there are inconveniences attending them in this particular service; viz., when loaded (which of course must be daily repeated), they move very slowly, and therefore are quite unfit for Horse Artillery—in order to load or unload, they must first be made to kneel down, which, in an action, they are not always inclined to do, and sometimes become very refractory and unmanageable. Also, whatever quantity of ammunition is required for the gun, must always be taken equally from both sides at the same time, to preserve its equilibrium, &c.

"These reasons determined a trial of light carriages in their stead, first beginning with Royal Howitzer ammunition, it being the most dangerous and liable to injury.

"Some of the hand-carts were selected for this purpose, and in order to travel the better, converted into curricles. The poles were accordingly lengthened, and cross bars fixed to support them in front of the horses' collars, much in the same manner as the 3 pr

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"These reasons determined a trial of light carriages in their stead, first beginning with Royal Howitzer ammunition, it being the most dangerous and liable to injury.

"Some of the hand-carts were selected for this purpose, and in order to travel the better, converted into curricles. The poles were accordingly lengthened, and cross bars fixed to support them in front of the horses' collars, much in the same manner as the 8 pr

"carriages formerly used in the Horse Artillery, only more simplified
 "These carriages were drawn by four horses each, and went through
 "all the marches of the army to and from Grand Cairo remarkably
 "well, travelling very rapidly with 48 rounds of the Howitzer ammunition
 "completed for immediate service, as already mentioned.

"The success of the currie carts (for field ammunition) induced a
 "trial if something might not be done with the wagons also, hitherto
 "looked upon as out of all question, except for the local duties of the
 "park. Some of them were taken to pieces, and all the heaviest parts
 "laid aside—that is, the bolsters, sides and shafts; the bottoms were
 "then contracted both in length and breadth, so as just to receive nine
 "or ten of the altered packing cases only. The hoops were lowered,
 "and the painted covers made to fit exactly. Poles were used instead
 "of shafts, and the usual swingle trees reduced fewer in number, the
 "rejected parts being weighed; no less than 600 lbs. appeared saved in
 "the draught by this simple operation, and a larger proportion of
 "ammunition conveyed by it at the same time with less labor.

"The arrangement made of the spare field ammunition on the passage
 "from Marjorice Bay to the coast of Egypt was very fortunate,
 "as it proved impossible to have carried any quantity forward otherwise
 "for want of conveyance, excepting a few camels taken from the enemy
 "on the first landing in Aboukir Bay.

"No carriage appears to want reform more than the common
 "artillery wagon. There is too much of it merely for carrying ammunition,
 "and it is too narrow for baggage or bulky stores.

"In the alterations made for the proposed arrangement of spare
 "ammunition, the boxes will require, for hard roads, to be more securely
 "fixed than was necessary for travelling in Egypt. Foreigners frequently
 "observe the singularity of shafts being preferred in the British
 "Artillery carriages to poles made use of by all other nations as being
 "simpler, lighter, and cheaper; added to which the experience of
 "having travelled over the most difficult features of Europe, and ground
 "of every description with them, fully evinces their perfect sufficiency.
 "A strong instance of the inconvenience of shafts occurred to us at
 "Rahmanieh. Just as one of the 6 pairs was limbering up, the shaft
 "horse was killed by the enemy, much time was lost in clearing the
 "carriage from him, and the harness being also damaged, rendered it
 "difficult to apply another in his place. Besides the articles already
 "detailed, numerous minute circumstances happened in the course of
 "the campaign which necessity continually urged the imagination to
 "provide against. Every movement by land or water was attended
 "with infinite labour and difficulties; added to which the violent heat
 "of the sun, and shocks received by passing over the formidable cracks
 "it occasioned in the ground (annually overflowed by the Nile) on the
 "march to Cairo, operated so powerfully on the carriages, as to require
 "perpetual attention and daily repair, without the most common mate-

“ rials for such occasions, either of wood or iron, to be found in the country.”

As Major Duncan remarks :—

“ The extremely interesting notes just quoted, although relating more to questions of ‘materiel’ than ‘personnel,’ still give a clear idea of the difficulties attending the movements of the artillery in Egypt, the overcoming of which was no less honorable, if indeed not more so, than their marked courage in the field.”

There is yet another passage in “ Duncan,” relating to General Lawson in Egypt, which is too instructive to be omitted, and which it would certainly do no harm for some of our “ for ever and again letter-writing officials” to mark and inwardly digest. It runs as follows :— “ Unfortunately for the modern artilleryman, General Lawson was a very bad correspondent during the War, and when the student comes meences anxiously to search for his despatches to the Ordnance, he finds, instead, indignant remonstrances addressed to the gallant general for his silence. He was so occupied with overcoming the natural difficulties of the expedition, that he had no time for writing.” Turning now to more recent years, we find that the ammunition wagons of the Field Batteries employed in the last China war were unable to keep up with their guns over the heavy soil, but not extraordinarily difficult country, which was met with on the march to Pekin.

Very many instances could be quoted of ammunition wagons being forced along with very great difficulty, during the very varied country marched over by the artillery attached to the numerous columns employed during the Indian mutiny.

Again, in Abyssinia, the ammunition wagons were taken up the passes only by dint of very great trouble and exertion, and perhaps there never was a more nearly impassible country traversed by the Field Artillery of any nation. The fearful rocky ascents and descents surmounted by “G” Battery 14th Brigade, R. A., with the teams drawing their equipment in the ordinary way, are standing monuments of what can be accomplished by British Artillerymen. At last the elephants had to come to the rescue, for men and horses could do no more. Had there been no wagon bodies, the difficulties of the first part of the march would, without doubt, have been most considerably decreased.

Since the construction of the proposed limber the following account of a recent instance, proving the immobility of the present ammunition wagons, has been received :—

“ In October, 1873, a force was ordered to proceed from Aden into Southern Arabia. The Artillery of this force consisted of one 6 pr. B. L. R. gun and two 4²-inch coehorn howitzers, mounted on their usual carriages, and drawn by mules in single draught. The country through which the force was to march had never before been traversed

" by wheeled carriages, there were no roads, and a great part of the route was believed to be over desert and drifting sand.

" Under these circumstances it was submitted by Major M. H. C. B. Steinman, R. A., that the 6 pr. wagons would be unable to accompany the force; and he suggested that wagon limbers only, without the bodies, should be taken.

" This suggestion was adopted, and the 6 pr. ammunition was carried in 4 limbers; one, to which the gun was limbered up, drawn by 4 mules; the others by 3 mules each, in single draught.

" The howitzer ammunition was carried on camels. The plan adopted answered well, and it was soon evident that had the wagon bodies been taken, they would have been utterly unable to proceed.

" The difficulties of the country proved to be very great—consisting chiefly of deep sand drifts, banks and ditches, and heavy cultivated soil, steep and narrow rocky paths, and generally what may be termed a very difficult country for Field Artillery.

" Even a 9 pr. Field Battery, with the present wagons, could not probably have got to the front at all, and it was a case in which the use of much heavier metal might possibly have been required."

With the brilliant example of Brigadier General Lawson before us, showing what can be done by a really practical artilleryman, shall we rest content to sit still, and let other nations pass us in the race for the improvement of Field Artillery equipment and organisation? Is there no second Lawson among us to arrange our artillery for the field, nor another Abercrombie to sanction and encourage such labors? Is there no possibility for our energies being ever again tried in a similar manner, either in Egypt or elsewhere? Shall we be content to have an artillery inferior in other respects, as it must necessarily be in point of numbers, to that of most continental nations? We appear to have enough of theorists and translators, and would fain have something practical instead. There is no reason whatever why we should not take the lead in artillery progress, and, battery for battery, excel in every point anything that can be shown against us. It is well known that after the battle of Waterloo our Field Artillery was the admiration of all the collected armies of Europe, and it can, without difficulty, become so once more. Conservative as he is to the back bone in all other matters, the writer of these notes cannot understand why we should doggedly cling to any particular system or equipment, after there have been grave disadvantages proved against it, and a way shown to get rid of those drawbacks.

At one time anything military was thought good and beyond improvement if only it was French, now-a-days, apparently because the bespectacled descendants of the Goths and Visigoths have for a time overwhelmed the unprepared Frenchmen, nothing military is considered of any value unless it be translated or copied from the German; and were the Russians to beat the Germans in battle, then probably

everything connected with war would be out of fashion, unless it were entirely "au Cossack." It is high time that we found out some practical method of expanding our force of Field Artillery to something like the proportions demanded by modern war; and also that it should be organised and handled in the field more closely in accordance with the tactics of the 19th century.

Our brigade and battery organisation is clumsy in the extreme, and should be replaced by complete and compact bodies of Field Artillery under superior officers, which should, as a rule, act in one mass, and manœuvre in the field with the same facility as a regiment of cavalry.

It may be said that the introduction of a system of limbers, instead of the present cumbersome ammunition wagons, would directly tend towards the accomplishment of both these ends.

It will be evident that bodies of Field Artillery would be less heavy and more easily kept in hand, as of course only the gun limbers should be with the guns. And by keeping up, horsed and manned, only one line of limbers besides the gun limbers, in time of peace, it will appear that we could have many more guns ready to hand without spending another sixpence, and these guns would only require the addition of a sufficient number of limbers to place them on a war footing,

Let us now turn to the consideration of the proposed limber. This limber has been actually constructed (of course at the writer's expense), and is at this moment parked in the gun shed of "A" Battery, 9th Brigade, Royal Artillery, at Secunderabad.

The principal points to which attention was required in the construction of the proposed limber were the following:—That the additional weight of the altered limber, carrying 18 more rounds of ammunition, should not be excessive; that the balance of the shafts, or rather the weight on the shaft horse, should not be increased, but on the contrary, if possible diminished; and that the limbering up of the gun should in no way be interfered with.

In the following lines the reader will be able to judge for himself, how far success has been obtained in the above particulars. The extra ammunition carried is in itself of considerable weight, being not much short of 200 lbs., and it would appear necessary to compare the total draught of the proposed limber with that of the present ammunition wagon, in order clearly to show the full advantages claimed by the former over the present equipment. It will readily strike the reader, that even were the weight of the proposed limber packed equal to that of the ammunition wagon, a two-wheeled vehicle, like a limber, would not be so difficult to drag over bad ground or across ditches or nullahs, as a four-wheeled wagon, the hind wheels of which would catch with great force against the bank which had just been surmounted by the front wheels. The boxes of the proposed limber have been made 3½

inches longer (from front to rear) than the present boxes, and 2 inches wider. The depth has not been altered. The centre box has been lengthened to correspond; certain interior alterations have been made by which every space in the boxes is filled up with ammunition, but these cannot be thoroughly explained without a diagram; twenty-seven (27) rounds are carried in each box, or half as many more as are now in a limber box. A time fuze and also a percussion fuze is carried with each limber for every round on that limber, also tubes in plenty, and guns, stores, &c. complete, as in present equipment. The extra weight of each limber box empty is about 17 lbs. in the proposed limber, and the total extra weight of the three boxes (including centre box) packed, is about 236 lbs., showing that the weight of the 18 additional rounds, extra fuzes, fuze implements, gun stores, &c. make up about 200 lbs.

It may be remarked that the extra 236 lbs. that would have to be drawn, is in the most advantageous place for draught, that is, close to the wheel horses, whereas the 2 cwt. which has been taken off the weight of the 9 pr. gun, was in the worst place, namely, in the metal of the piece, and as far as possible from the horses.

The fraction of the present and proposed limbers packed in marching order has been taken, and found to be 38 lbs. in the case of the first, and 59 lbs. in the second, or very nearly a proportion of 2 to 3. This is a natural consequence of the proposed limber carrying exactly the contents of 3 boxes, while the present limber holds those of only two. The traction of the service ammunition wagon was not taken, as it would clearly have been more than double that of the experimental limber. The total weight of the two proposed limber boxes, packed, is about 440 lbs. less than that of the present four boxes carried on the wagon body.

With regard to the weight behind the team, it is obvious that the proposed limber need not be compared with the present pattern, as the latter does not travel by itself, and when compared with the ammunition wagon, the advantage of the new limber is so great, as above shown, in the matter of the boxes alone, that the further advantages in mobility of the experimental limber need not be again noticed.

With respect to the gun limbered up, the extra weight of the new limber, when added to that already behind the gun team of the 6 cwt. 9 pounder, would bring up the total again to within 37 lbs. of the weight behind the 8 cwt. 9 pounder team. There is however this advantage, besides the good position of the weight already noted, that, once in action, the weight of the ammunition would naturally rapidly become less and less, and even at the worst the weight for the horses to pull is only 78 lbs. more than that behind the Horse Artillery team of the Germans, who are supposed to be tolerably astute in these matters.

To compensate for these 78 additional pounds, however, the new limber carries 18 more rounds of ammunition with the gun itself, than

there are with the German piece, no inconsiderable advantage in the field. Again, the extra weight of the experimental limber, when added to that already behind the 8 cwt. 9 pounder gun team, gives only 65 lbs. more than the weight which the German Field Battery Gun team has to draw, while on the other hand there would be no less than 24 more rounds of ammunition with the British gun than with that of the foreigner.

The experimental limber has been tried to a certain extent, both up and down hill with two horses only, and it is not considered that the extra weight is of any practical detriment, as there can be no doubt that this limber would be able to accompany its gun wherever the latter could be taken, which is notoriously not the case with the present ammunition wagon. Moreover, whenever an exceptionally difficult place were met with on the march, a pair of leaders could be temporarily hooked in; and it is not contemplated that the first line of limbers (which may be said to correspond with the present wagons,) should have less than 4 horses when in the field, and rapidity of movement would be necessary. Brigadier General Lawson's limbers in Egypt, it should be noted, had 4 horses each. The limbering up of the proposed limber is as easy as that of the service pattern.

Now, with regard to the weight on the shaft horse. The experimental limber has been so constructed, that the weight on the shaft horse is very considerably less than it is in the present equipment.

The present and proposed limbers were packed exactly alike in marching order, and the shafts kept in both cases at the points, 3 feet 9 inches from the ground. The weights were then taken at $17\frac{1}{4}$ inches from the points of the shafts. When limbered up, the weight on the horse's back with the new limber was found to be $50\frac{1}{2}$ lbs. and with the service limber $71\frac{1}{2}$ lbs. or a gain in favor of the experimental limber of $21\frac{1}{2}$ lbs. When unlimbered, the bearing on the shaft horse was 64 lbs. in the proposed limber as against $82\frac{1}{2}$ lbs. with the limber of the present pattern, telling again to the advantage of the new limber to the extent of $18\frac{1}{2}$ lbs. No gunners were mounted throughout these experiments, as it is very difficult to get them to sit exactly in the same manner at different times.

NOTICE.

The following is the decision of the Judges at the Exhibition of Military Drawings:—

OFFICERS PRIZES:

1st Prize won by Captain P. C. Story, Garrison Instructor.

2nd Prize won by Lieutenant H. A. Sawyer, Assistant Garrison Instructor.

NON-COMMISSIONED OFFICERS AND PRIVATES.

1st Prize won by Color Sergeant Cunningham, 2-15th Regiment.

2nd Prize won by Sergeant Macaulay, 2-60th Royal Rifles.

The Diagrams to illustrate Lieutenant Green's paper are not quite ready, and will be issued with the next number.

Members are particularly requested to pay their arrears of subscription, either to the Secretary, or to the Alliance Bank, Simla.

Should any Member who wishes to cease, or has ceased subscribing, continue to receive copies of the Journal, it is requested that he will kindly communicate with the Secretary.

Members who have been on furlough, and have never expressed their intention of withdrawing from the Institution, are on their return to this country supplied with the journal and their subscription is due from the date of such return.

H. H. STANSFELD, LIEUT.-COLONEL,

Secretary U. S. I. of India.

Simla, 20th September 1876.

NOTICE.

MEMBERS of the Institution who have not already done so, are earnestly requested to pay their arrears of donation and subscription, either to the Corresponding Member at their station, or direct to the Secretary at Simla.

Some members still owe their donation and three years' subscription.

Officers who may wish to become members are requested to be kind enough to forward their donations and subscriptions at the same time as they express a wish to join the Institution, and also to inform the Secretary whether their subscription is intended to be for the current year, which ends on the 31st May 1877.

Members can pay their subscription to the Alliance Bank, Simla, if more convenient, and the Bank will grant receipts for any money sent.

The entrance fee is 5 rupees and the annual subscription 5 rupees.

Members on changing their addresses are particularly requested to notify the change to the Secretary, in order that delay in forwarding the Journals may be avoided as much as possible.

The address book is corrected up to date from the Army Lists, but mistakes are occasionally unavoidable, unless members themselves promptly notify their change of residence.

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H. H. STANSFELD, LIEUT-COLONEL,
Secretary.

ORIGINAL PAPERS.

I.

EUROPEAN FOREIGN SOLDIERS IN THE BRITISH SERVICE IN INDIA.

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CHAPTER I.

THE want of a regular and sufficient supply of European recruits for the garrisons which they found it necessary to maintain, was one of the chief difficulties of the early European settlers in India. This was partly caused by the difficulty experienced in procuring recruits of their own nation, and partly by the excessive mortality amongst the recruits on their voyage to India. But very often it was entirely due to the cupidity of the authorities at home, who, looking upon the space required on their ships for soldiers, as so much tonnage lost for cargo, resorted to every expedient they could think of, to avoid sending out soldiers from Europe. Thus, in the earlier records of the East India Company, we constantly find the Directors desiring the Governors of their settlements in the East to enlist such Europeans as they could obtain in India. This course was pursued for very many years, not only by the English, but also by the French, so that until the arrival, in September 1746, of the French troops brought by Labourdonnais, nearly one half of the garrison of either power was composed of men of all the nations in Europe.* Later on we find the English, in addition to recruits of their own nation, receiving reinforcements of Swiss and Hanoverians, forming the French soldiers who deserted to them into independent companies, and incorporating into their battalions such French, Dutch and German prisoners as were willing to enter their service; and it is of these foreign soldiers that I propose to give some account; but before proceeding to do so, it will be as well to narrate briefly the steps taken by other European nations to keep up their garrisons in India.

The Portuguese, who were the first European power to establish a settlement in the East Indies, early experienced the necessity of relieving the mother country from the constant drain upon her for recruits. Albuquerque, after the conquest of Goa in 1510, determined to make it a Portuguese colony. To assist in accomplishing this, he married

* Calcutta Review, vol. v, p. 254.

such of his followers as desired to reside there, to the daughters of natives whom he had taken prisoners; the only stipulation being, that the brides should become Christians, and, as the prejudices of caste and religion were not deeply rooted amongst the natives of that part of India, this obstacle was easily overcome. In promoting these marriages Albuquerque states his object to have been, "that the Indians might be united to his nation by affinity, and that there might be no necessity for bringing fresh supplies out of Portugal to the depopulating of the kingdom."* At first these weddings appear to have been celebrated under compulsion, but the Viceroy attended at many of them, and bestowing some of his best appointments on the bridegrooms they soon became popular. The offspring of these marriages rapidly degenerated, and a writer of 1583 says, "the Portuguese in India are, many of them, married with natural born women of the country, and the children proceeding from them are called *Mesticos*; these *Mesticos* are commonly of a yellowish colour; the Portuguese being in the third degree, do seem to be *natural Indians*, both in colour and fashion."

It was not merely by these means that the numbers of the so-called Portuguese were increased, for it appears that men of rank would often persuade their slaves to become Christians, standing sponsors for them, and giving them their own name, and these converts, adopting the European style of dress, were afterwards known as Portuguese. Large additions also were made to their numbers by the forcible conversion of natives captured in war, or kidnapped by the Portuguese pirates settled at Chittagong, who,† "not only scoured the sea coasts but entered the rivers, especially the Ganges, and often penetrating forty or fifty leagues up the country, surprised and carried away whole towns and villages of people with great cruelty, and burning all which they could not carry away. They ransomed the old people; but the young ones they made rovers of, and such Christians as they were themselves, boasting that they made more converts in one year than the missionaries through the Indies did in ten."

During the latter portion of the seventeenth and the commencement of the eighteenth century, many of these men were enlisted as soldiers by the English, and Orme, writing of the state of the European garrisons in India in 1746 says:‡ "The Christians, who called them-

* History of the Military Transactions of the British Nation in Indostan from the year MDCCXLV. By Robert Orme, vol. 1, p. 78.

† Bernier's Travels.

‡ The Portuguese language long survived the extinction of the Portuguese power in India. "It was the lingua franca of all the foreign settlements around the Bay of Bengal, and was the ordinary medium of communication between the Europeans and their domestics, while Persian was the language of intercourse with the native courts. Even in Calcutta Portuguese was more commonly used by the servants of the Company and the settlers than the language of the country. The charter granted to the East India Company at the beginning of the eighteenth century contained a provision that they should maintain one minister at each of their garrisons and superior factories, and that he should be bound to acquire the Portuguese language within a twelve month of reaching India. Clive, who never was able to give an order in any native language, spoke Portu-

selves Portuguese, always formed part of a garrison; they are little superior in courage to the lower castes of Indians, and greatly inferior to the higher castes, as well as the northern Moors of Indostan; but because they learn the manual exercise and the duties of a parade with sufficient readiness, and are clad like Europeans, they are incorporated with the companies of European troops. From wearing a hat, these pretended Portuguese obtained amongst the natives of India the name of *Topasses*, by which name the Europeans likewise distinguish them." It is unnecessary to give any further account of these Asiatic Portuguese, of whom frequent mention will be made in these pages.

The Dutch never formed any important settlement on the continent of India, but having secured a firm footing in Java, they determined to establish a colony there, and in 1619 laid the foundation of a city which was to be the capital of the Dutch settlements in the East. This town, situated on the north coast of the island, they called *Batavia*, after the old name of their country. Great privileges were offered to such of their countrymen at their other settlements in the East as would go and live there with their families, "for which end," says *Pietro della Valle*, writing of the Dutch at *Surat* in 1623, "many of them, for want of European, have taken Indian, Armenian and Syrian women, and of any other race that fell into their hands, so they be, or can be made, Christians." The efforts of the Dutch, however, to establish a colony in Java, have never been so successful as to render it unnecessary for them to obtain recruits from Europe, but men of their own nation were difficult to procure, and therefore Swiss and Germans were enlisted in their stead. From an early period too, they enlisted Malays and Africans for their garrisons in Java and Ceylon, and armed and disciplined them in the European manner.

When Lord Macartney visited *Batavia* in 1793, on his way to China, the principal military strength of the Dutch at that place consisted of a regiment of Germans, which the Dutch East India Company hired, for a stipulated rate from the Duke of Wirtemberg. This regiment had originally been commanded by a natural son of the late Duke, but he had died within six weeks after his arrival at *Batavia*. Three of his younger brothers were officers in the regiment, the youngest of whom, Count Charles, commanded the guard of honour furnished for the embassy.

The Dutch troops being exempted by law from service in the East, and volunteers in Holland not being forthcoming in sufficient numbers, the Dutch still experience great difficulty in keeping up their European garrisons in Asia. After the disbandment of the Swiss Legion raised

fluency. The use of this language has since died out in Bengal so completely, that the descendants of the Portuguese now speak Bengali from their cradle; yet down to so late a period as 1828, the governor of Serampore, a Norwegian, received the daily report of his little garrison of thirty sepoys from the Native Commandant, a native of Oude, in Portuguese."—p. 22, vol. I, of the *Life and Times of Carey, Marshman and Ward*. By John Clark Marshman.

by the British Government during the Crimean war, a number of the men were enlisted for service in Java,* and within the last twelve months, a retired Dutch officer, Major Steck, and a man named Ludwig Schwarz, were prosecuted at Darmstadt for enlisting men for Acheen. It was proved that Steck had provided recruits with money to take them to Holland, and from the correspondence of Steck with the Secretary General of the Dutch colonies, which was seized, it appeared that Steck had proposed to raise a free corps of 2000 men for the war in Acheen. This proposal was declined, in order to avoid complications with the German Government, but Steck was requested to indicate the means for arriving at the object without compromising his Government. It was further proved that he had enlisted recruits for Acheen, in Switzerland as well as in Germany. About the same time, a Frenchman of the name of Despieg, who had in 1871 been appointed, by the Paris Commune, professor of law at the University of Paris, was tried before the Correctional Tribunal at Brussels, for forging papers, for the purpose of furnishing men to the crimps who supplied the Dutch Government with men for Acheen. During the trial the Government prosecutor stated that more than 500 men had been furnished for Dutch India by means of forged documents, and of course under false names, from Brussels alone. Large numbers also were recruited in other Belgian towns.

The French do not appear ever to have brought from Europe any soldiers but those of their own nation. A part of the force, however,

* These men were induced to enlist for service in Java by promises of active service and rapid promotion. On their arrival, however, they were, contrary to their expectation, drafted into regiments doing garrison duty at the different forts in the island. Some of the men in garrison at Djokjokarta, irritated at the deception which had been practised upon them, listened to the projects of one of their number named Borjot, who proposed to massacre all the Dutch in the island, and to make Java a republic. Having sounded the Swiss in the other garrisons, and finding many of them willing to join in the plot, he fixed a day and hour when, in each place the foreign soldiers were to rise and massacre all of Dutch blood, except the young wives and daughters, whom they intended to appropriate to themselves. The time selected for the massacre was a night upon which the Resident at Djokjokarta was to give a ball. The ball had commenced, when an old lady seated in the verandah of her house, which was close to the Residency, was suddenly startled by the appearance of a soldier, who, addressing her in a whisper, told her of the plot and urged her to send some one at once to warn all who were at the Residency of the approaching danger. The lady at first treated the warning lightly, but the man, persisting in his statement, saying "I belong to the party, but I cannot do it, I cannot bear to think of it, now the time has come" she sent a servant to the Residency. On receiving the message, the Resident concealed its purport from all his guests except the officers of the garrison, whom he advised to proceed as cautiously as possible to secure the persons of the conspirators before they could have any idea that their intended victims had been made acquainted with their designs. Quietly withdrawing from the ball, the officers proceeded quickly to the fort, the gates of which were noiselessly closed as soon as they had entered. The Swiss sentinels were speedily disarmed and made prisoners by the Dutch and Native soldiers. The conspirators in the barracks, bewildered by the unexpected discovery of their intentions, made but a feeble resistance. Telegrams were immediately sent to warn the commandants of the other forts of the impending danger. At Surabaya, the men's fire-arms were removed whilst they were asleep, so that on awaking about midnight, they found themselves unable to carry out their deadly purpose. The following morning Borjot and a knot of the ringleaders were tried, found guilty and executed before the gates of the fort.—See *Life in Java*, and *Sketches of the Javanese*. By William Barrington d'Almeida, vol. II., chap. v.

which Labourdonnais landed at Madras in 1746 consisted of a body of Caffre slaves, natives of Madagascar and the eastern coasts of Africa, whom he had drilled and disciplined at the Mauritius. The French, moreover, were the first to adopt the idea of training and disciplining the natives of India as soldiers after the European fashion.*

Bombay having been ceded to England as part of the dower of the Infanta Catharina on her marriage with Charles the Second, the Earl of Marlborough, with five ships, having on board a military force of four companies of 100 men each, was despatched from England to receive possession of the island. The fleet arrived at Bombay on the 18th September 1661, and the English Commander at once demanded that the island should be made over to him. The Portuguese, however, after making many excuses for not complying with the demand, finally refused to arrange any terms or listen to any proposals. Shortly after this, Marlborough sailed for England, having landed Sir Abraham Shipman and the troops on the island of Anjideva. Here they remained throughout the rainy season, and owing to want of provisions, proper accommodation, and the unhealthiness of the climate, Sir Abraham Shipman and 300 of his men perished. After Sir Abraham Shipman's death, Mr. Cooke, who had been his secretary, concluded a treaty with the Portuguese Viceroy, by which Mr. Cooke renounced, on the part of England, all pretensions to the dependencies on Bombay, and accepted the cession of the island of Bombay only, to which place he then removed the remainder of the English force.†

The English Government, having found that Bombay cost more than it yielded, agreed to cede it to the Company. Accordingly the island was formally transferred to the East India Company on the 23rd September 1668, into whose service the troops were invited to enter, a proposal, which after some hesitation, they unanimously accepted. At this time the garrison consisted of 208 men of whom only 90 were English, and the rest French, Portuguese or Natives. Some German recruits were subsequently sent out, and in a despatch relative to the affairs of Bombay, written during the season 1676-77 from Surat, by President Aungier, he states that "the charges for the Infantry had been brought as low as practicable, and as the German recruits had behaved with sobriety and regularity, it was recommended to the court that a proportion of them, being Protestants, should annually be embarked." In the reply to this despatch he was informed that 40 recruits had embarked on the ships of the season, but it did not specify whether any of them were Germans. In 1685-86 the Court wrote: "The charges of sending recruits from England to India having been expensive, and from

* When the Emperor Akbar dispatched an army from Lahore to recover Scinde, the Scindians were aided by a band of Portuguese and two hundred natives *dressed as Europeans*, who are to be, therefore, considered as the first sepoys in India. The Scindians are also said to have had a fort, defended by an Arab garrison, the first mention, Elphinstone states, that he has observed of these mercenaries, afterwards so much esteemed and so frequently employed. Scinde fell in A. D. 1592.

† Bruce's Annals of the East India Company.

the mortality on the voyage the supply insufficient, it was ordered that the troops should be recruited in India from the crews of the shipping, with consent of the Commanders, and that such Scotch, Dutch and Danes, as might be disposed to enter the service might be engaged."

The Court, in 1691-92, recommended the Presidency of Bombay to engage (if they could be obtained) about 60 Armenian Christians to serve as soldiers, and to offer them a bounty of 40 shillings per man and the same pay as the English soldiers, "because, professing nearly the same religion, in other respects of good character, they might be deemed almost a part of the Company's Military Establishment, as the efficient strength of the garrison must always depend upon English soldiers, and as recruits could not be sent from England during the war, the President might embody about sixty Madagascar negroes (their constitution rendering them equal to the most laborious duties) to be commanded by English officers; and the same number of Arab Lascars, whose bravery and active service could be more depended on." Sir John Gayer was appointed President of Bombay in 1693, and on his arrival in May 1694 he reported that "the garrison was weak, consisting of only about 100 English, Dutch and French soldiers, and therefore it would have been imprudent to have discharged the Gentoos, till a reinforcement should arrive from Europe," and a little later in the season he requested that "a reinforcement of soldiers might be sent, for although forty-eight had arrived, it had been found impracticable to obtain either Madagascar blacks, or to induce the Armenians to serve as soldiers." His representations, however, do not appear to have met with any attention, for in 1697 the garrison had dwindled down to 27 European soldiers.

The earliest detailed return of the strength of any English garrison in India is that of Bombay in 1741. It was composed of one regiment, "consisting of a captain, 9 lieutenants, 15 ensigns, a surgeon, 2 sergeant majors, 82 sergeants, 82 corporals, 26 drummers, 319 European privates, 31 mustees—by which term we conceive mastisas, or Indo-Europeans are meant.—900 Topasses, 27 servants, 2 subneeses or native paymasters, a linguist and an armourer—in all 1499 men, distributed into seven companies. Their monthly pay amounted to 10,314 rupees."*

On news reaching India of the commencement of hostilities in 1744 between Great Britain and France, the English at Madras and Fort St. David, inclusive of the European soldiers and 100 Topasses, did not exceed 600, whilst the French at Pondicherry numbered no more than 436. The French were the first to receive reinforcements; for on the 27th June 1746 Labourdonnais, after an action with the English fleet under Commodore Peyton, anchored in the roads of Pondicherry with nine vessels, having on board 3300 men, of whom 700 were either Caffres or lascars. Dreading lest his operations should be interrupted by the

* Bombay Quarterly Review, April 1857.

English fleet, he delayed assuming the offensive until they were obliged at the end of August, to leave the coast. On the 3rd September, having landed a portion of his force at a point four leagues south of Madras, where it was joined by a detachment from Pondicherry, he advanced the next day against Madras with a force of 1100 Europeans, 400 Caffres and 400 natives disciplined in the European manner. The English at Madras at this time numbered 300, and of these only 200 were soldiers. On the 10th September, after a bombardment of five days, Madras surrendered to the French. On the 20th of the following month, Labourdonnais having made over the Government of the French possessions to M. Dupleix, sailed from the coast, leaving behind him 1200 disciplined men; 450 more were landed out of three ships which had recently arrived, and 8 or 900 sailors were taken out of the ships on the coast and disciplined as soldiers. By these additions the French force amounted to 3000 Europeans.

In June 1747 the English at Fort St. David were reinforced by the arrival of 100 Europeans, 200 Topasses and 400 Sepoys from Bombay, and by 400 Sepoys from Tellicherry. The Company's ships, moreover, brought 150 recruits from England, and in the following January Major Stringer Lawrence arrived with a commission to command all the East India Company's forces in India.

The ministry of England having determined to equip an armament which, when joined by the ships then in India, should be of sufficient strength to besiege Pondicherry, assembled a fleet, on board of which they embarked twelve independent companies and a detachment of Royal Artillery. Admiral Boscawen was appointed to the command of both the naval and military forces. On the 29th July 1748 this fleet arrived at Fort St David, where the squadron under Admiral Griffin was awaiting its arrival. The fleet now consisted of more than thirty ships, none of which were of less than five hundred tons, and thirteen were men-of-war of the line. This was by far the most formidable marine force belonging to any one European nation that had ever been seen together in the East Indies, and the English were now confident that the loss of Madras would be speedily avenged by the capture of Pondicherry.

Before the arrival of the fleet preparations had been made at Fort St. David to enable Admiral Boscawen to undertake the siege of Pondicherry without delay. The troops having been landed, and the battering guns and heavy stores sent by sea, the army commenced its march towards Pondicherry on the 12th August. It consisted of the following troops of the King's service:—twelve Independent companies of 100 men each, 800 marine belonging to the ships, and 80 men of the Royal Artillery; and of the Company's service, a battalion of 750 men, of whom 300 were Topasses, together with 70 Artillerymen; the Dutch at Negapatam sent a detachment of 120 Europeans, and there were on board the ships ready to be landed 1,000 sailors, who had been taught the manual exercise at sea, in all 3720 Europeans, and 300

Topasses ; to these were joined 2000 Sepoys, paid by the Company, who as yet however were but imperfectly disciplined.

I do not purpose giving an account of the siege of Pondicherry, it will be sufficient to say, that owing to want of skill and experience on the part of the Commander, and the ignorance of their duties displayed by the officers employed as Engineers, the besiegers made but little progress. The rainy season moreover having commenced earlier than usual, and there being a great deal of sickness amongst the troops, a Council of War was summoned on the 30th September, at which it was determined to raise the siege before the country should be flooded, and the removal of the cannon and heavy stores rendered difficult, if not impracticable. Five days were employed in shipping the cannon and stores and re-embarking the sailors, and on the 6th October the troops commenced their march back to Fort St. David. The loss in action and by sickness during the siege amounted to 800 soldiers and 265 sailors, in all 1265 Europeans. The French garrison consisted of 1800 Europeans, and their casualties amounted to 200.

In November, news was received that a cessation of hostilities had been proclaimed in the preceding April between Great Britain and France, and in the middle of August 1749, Madras, in accordance with an article in the treaty of Aix la Chappelle, was delivered up to the English.

The two nations no longer authorized to fight against each other "took the resolution of employing their arms in the services of the Princes of the country."* The English were the first thus to employ their troops ; having in the latter end of March 1749 dispatched a force from Fort St. David for the purpose of re-instating Sahoojee, the deposed king of Tanjore. They soon found that his cause was hopeless and having, after one unsuccessful attempt, captured the fortress of Devicotta, made peace with the reigning king, who made over to them Devicotta and lands adjacent to it, calculated to yield an income of 9000 pagodas ; and agreed to pay the expenses of the war, and to settle a pension of 4000 rupees a year on Sahoojee ; the English on their part agreeing to be responsible that Sahoojee gave no further trouble.

It was not long, however, before the English and French found themselves ranged upon opposite sides. For the French, having determined to support the pretensions of Chunda Sahib to the throne of the Carnatic the English deemed it necessary to counteract their schemes by aiding the cause of Mahomed Ali, the son of the late Nawab, and for the next five years, we find these two nations madly exhausting their resources in the cause of native princes.†

During these wars, the recruits who arrived from England were described as the refuse of the vilest employments in London, and as the European Battalion was still largely composed of foreigners, deser-

* Orme, vol. 1, p. 107.

† Marshman's History of India, vol. 1, p. 249.

tions to the French were very numerous. Thus, when M. Law, on the 15th April 1752, dispatched a force of 80 Europeans and 700 Sepoys to surprise Samiaveram, one half of the former were deserters from the English, and were led by an Irishman ; and when M. Law surrendered at Seringham in June of the same year, it was agreed that the officers should give their parole not to serve against the Nawab or his allies, that the private men of the battalion, Europeans, Caffres and Topasses, should remain prisoners, and that the deserters should be pardoned. The number of the French troops who laid down their arms on this occasion was 35 commissioned officers, and 725 battalion men capable of bearing arms, besides 60 sick and wounded in the hospital, together with 2000 Sepoys ; the number of the deserters is not recorded.

Both the English and the French employed Africans, or Caffres as they were termed, as soldiers, and on many occasions they behaved with great gallantry. The number at any one time in the service of the English does not appear to have exceeded the strength of two companies. They were generally attached to the Company's European battalion, some times in distinct companies, at others blended with the Europeans.

The difficulty experienced in getting able bodied recruits in England induced the East India Company to seek for recruits in Switzerland, and in 1752 four companies of Swiss, each of 100 men, with officers of their own nation, were embarked for service in India. One company, commanded by Captain Alexander Zeigler, was sent to Bombay, another company to Bengal and two to Madras. Immediately after landing, one of the two latter companies, under command of Captain Schauf, was dispatched to Fort St. David, at this time threatened by the French, and contrary to the advice of Major Lawrence, was embarked in massoola boats and ordered to proceed by sea, the Council at Madras giving it as their opinion that the French would not dare to violate the English flag on this element. No sooner, however, did the boats come in sight of Pondicherry, than a ship in the roads weighed anchor, and seizing all the boats, carried the troops to that place, where Dupleix kept them prisoners, insisting that the capture was as justifiable as that which had been made of the French troops at Seringham.

Directly news of this loss reached Madras, Major Lawrence embarked with the other company of Swiss in one of the Company's ships, and arrived at Fort St. David on the 16th August 1752. The next day he took command of the army, which now consisted of 400 Europeans, with eight field pieces, 1700 Sepoys and 4000 of the Nawab of Arcot's troops, chiefly cavalry, with some Infantry armed in the native fashion.

The French, who numbered 400 Europeans, 1500 Sepoys and 500 Native Cavalry, immediately retreated to Bahoor, but finding they were followed, continued their retreat towards Pondicherry and encamped between the bound-hedge and Villanore, from whence their Commanding Officer, M. Kirjeau, a nephew of M. Dupleix, sent to Major Lawrence

protesting against the English violating the territory of the French when the two kingdoms were at peace. As Major Lawrence had been instructed not to enter the limits of the territory originally assigned to the French, and which were defined by the bound-hedge,* unless the French should have first violated the English territory, he contented himself with attacking their advance post at Villanore, which they immediately abandoned and retreated with their whole force under the walls of Pondicherry.

They shewed so little inclination to quit this situation, that Major Lawrence, imagining nothing would entice them out of it but a persuasion that the English were become as unwilling as themselves to venture a general engagement, retreated precipitately to Bahoor. The stratagem took effect with Duplex, who, in spite of his remonstrances, ordered M. Kirjean, the French Commander, to follow the English. In obedience to his instructions, M. Kirjean marched and encamped within two miles of Bahoor, when Major Lawrence at once made the necessary preparations to attack him.

At three o'clock on the morning of the 26th August, the English moved out of their camp in the following order: The Sepoys formed the first line, the Europeans the second with the Artillery on its flanks, the Nawab's cavalry were stationed to the right, on the other side of a high bank which ran from the camp of the English to that of the French. A little before dawn the sepoy were challenged by the enemy's advanced posts, and not replying, were fired upon. They returned the fire, and pushing on, soon got engaged with the enemy's sepoy, and continued so until day-break, when the French European battalion was discovered drawn up with one flank resting on the bank, the other on a large pond. The English battalion then halted to form its front equal to that of the enemy, a heavy fire being kept up from the eight field pieces whilst this was being effected. It then advanced, the field pieces maintaining their fire until that of the battalion could tell with effect; it continued its advance, firing as it pressed on, until it arrived within charging distance. It then charged—the French advanced at the charge to meet it, until the bayonets of the two battalions crossed. For a few minutes there was a stubborn hand to hand fight, but the English Grenadier Company, together with two platoons, breaking

* This hedge, which was at a distance of a mile from the walls of Pondicherry, was composed of large aloes and other strong plants peculiar to the country, intermixed with cocoanut trees, and formed a defence impenetrable to cavalry, and of difficult passage for infantry. It began on the north side close to the sea shore, and continued five and a half miles, forming a large segment of a semi-circle, until it joined the river Ariancopan to the south, at about a mile and a half from the sea shore, and from this part the river served to complete the line of defence. There were five roads leading from the town into the adjacent country and in each of the openings in the hedge was built a redoubt mounted with cannon. It is probable that the hedge, at the same time that it was intended to be a defence against sudden incursions, marked the limits of the territory conceded by the prince of the country to the French when they first established themselves at Pondicherry; and hence obtained the name of the bound-hedge—see Orme, vol. I., p. 101—Fort St. David and other settlements were also surrounded by a pound-hedge.

through the enemy's line, the whole gave way, and no quarter being expected in such a conflict, the French dispersed in all directions, throwing away their arms as encumbrances to their flight. The Nawab's cavalry had been instructed to seize this moment for charging the French, but instead of doing so, or following in pursuit, they betook themselves to plundering the French camp. The sepoys, however, followed up the French and succeeded in capturing some of them.

The battle of Bahoor is one of the few instances on record where two bodies of men, of nearly equal strength, have at the same time advanced to the charge, and have actually met and crossed bayonets. The French loss was 13 officers, their Commander, M. Kirjean, included amongst them, and 190 Europeans made prisoners; a greater number were killed, upwards of 100 of the French having, it is said, fallen by the bayonet alone; and if the Nawab's cavalry, instead of plundering the camp, had done its duty for half an hour, not one of the enemy could have escaped. All the French guns, together with the whole of their ammunition and baggage, were captured. Of the English, 1 officer was killed and 4 wounded, and 78 men of the battalion were killed and wounded, mostly by bayonet thrusts.*

This victory broke the French force so effectually that Dupleix was obliged to wait for the arrival of reinforcements before attempting anything further in the field, nor was this the only result, for it checked the resolution which the Regent of Mysore had formed of openly declaring for the French. Unfortunately, owing to uncertainty as to the designs of the Mahrattas under Morari Rao, Major Lawrence was unable to follow up his success to the extent he desired; Clive, however, with only 200 European recruits and 500 newly raised sepoys, reduced the strongholds of Covelong and Chingulput, whilst Major Lawrence and the Nawab, appearing before Wandewash, were only induced to suspend hostilities, by an immediate payment of three lakhs of rupees.

The army returned from Wandewash to Tiruvadi, where they prepared to canton themselves for the rainy season. On the night of the 31st October the monsoon began with a violent hurricane; the rain, which fell continuously for several days, laid the whole country under water, and sickness spread amongst the troops to such an extent, that Major Lawrence was obliged to retire on the 15th November to Fort St. David.

Perceiving the little advantage that the English had made of the victory at Bahoor, the Regent of Mysore recovered from the consternation into which he had been thrown by that event, and again turned a willing ear to the representations of the French, and so ably did Dupleix carry on his negotiations that before the end of the year he had strengthened himself by an alliance with the Regent of Mysore, the Mahratta leader Morari Rao, and Mortiz Ali, the governor of Vellore.

* Orme, vol. I., p. 256.

On the 3rd January 1753, the French, consisting of 500 European Infantry, 60 Horse, and 2,000 Sepoys, together with Morari Rao and 4,000 Mahrattas, including two companies of Topasses in their pay, marched from Valdore, and entrenched themselves on the banks of the river Panar, in sight of Tiruvadi. Immediately upon hearing of the advance of the French, Major Lawrence and the Nawab returned from Fort St. David to their former encampment at Tiruvadi with a force of 400 Europeans, 2,000 Sepoys, and 1,500 dastardly Cavalry, belonging to the Nawab.

In the meanwhile the Regent of Mysore was blockading Trichinopoly, which was garrisoned by Captain Dalton, with 200 Europeans and 1,500 Sepoys, and M. Dupleix, in order that the Mysoreans might not be interrupted in their operations, ordered the troops on the Panar to remain entirely on the defensive, and to strengthen their entrenchments to the utmost of their ability, and this they did with so much skill and diligence that Major Lawrence considered them too formidable to storm with the force at his command, and all his efforts to entice the French out of their entrenchments were ineffectual.

At the end of March, a reinforcement of 200 Europeans, of whom 100 were a Company of Swiss, lately arrived from Bengal, were sent from the Presidency to Fort St. David, where they were joined by the Battalion, and on the 1st April the whole, with a large convoy of provisions, set out for the camp. Scarcely had the convoy passed the bound-hedge, than the Mahratta Cavalry commenced to harass it, and on this day behaved with more activity than ever, until at last when within three miles of Tiruvadi, they made a general and vigorous charge, surrounding the front of the line, and were with great difficulty repulsed, many of the horses falling within a few yards of the field pieces. Amongst the slain was Bazin Rao, a nephew of Morari Rao; his death damped the ardour of the Mahrattas, and they retreated to a distance.

After the arrival of the convoy in camp, Major Lawrence lost no time in advancing nearer to the enemy's position, and having captured an advanced post, established a battery of two eighteen pounders at a distance of 700 yards from their entrenchment. It was then discovered that the entrenchment consisted of a rampart, cannon proof, with flanking works at proper intervals; that it had a broad deep ditch, and a good glacis; and that it was defended by thirty pieces of cannon. The battery fired for some time without any effect; and the increased distance from Fort St. David having augmented the difficulty of obtaining supplies, it was determined to desist from the attack and to return to Tiruvadi.

Three months having been effectually employed in trying to bring the enemy to a general engagement, Major Lawrence was meditating transferring the scene of operations to some other part of the country, with the intention of enticing the French out of their impregnable position, when he suddenly received intelligence from Trichinopoly which compelled him at once to proceed to the relief of that place.

The Regent of Mysore, by dividing his army into two camps, had effectually prevented any supplies being brought into the city, and Captain Dalton having reason to suspect that the amount of provisions in store was less than the Governor Khair-oo-deen, brother-in-law of the Nawab Mahomed Ali, represented, determined to ascertain by personal examination the actual state of his magazines. To his great dismay Khair-oo-deen now confessed that he had taken advantage of the scarcity to sell provisions at a high price to the inhabitants of the city, not doubting but that opportunities would offer for replacing them, and that the stock which remained was only sufficient to last fifteen days; in which time the army at Tiruvadi could hardly hear the news and march to the relief of the garrison. An express was at once sent off with this alarming intelligence to Major Lawrence, who received it at 10 P.M. on the 20th April. He at once issued orders for the troops to march at day break, and leaving Captain Chace at Tiruvadi with 150 Europeans and 500 Sepoys, he proceeded with the remainder to Fort St. David to collect the necessary supplies and stores.

On the 22nd April Major Lawrence set out from Fort St. David, and on the 6th May arrived in sight of Trichinopoly, and entered the city without any interruption. The number of the battalion was greatly diminished on this march, which was performed during the setting in of the land winds, when they blow with the greatest heat and violence. Besides several who died on the road, and others who were sent back sick to Fort St. David and Devi-cotta, 100 men unfit for duty were carried into the hospital at Trichinopoly on the day of their arrival. Many had likewise deserted, particularly the Swiss, of whom a sergeant and 15 men went off in one day, so that the whole force, including what the garrison of Trichinopoly could spare for the field, amounted to no more than 500 Europeans, 2,000 Sepoys and 3,000 of the Nawab's Cavalry.

As soon as Dupleix was certain of the route Major Lawrence had taken, he detached M. Astruc with 200 Europeans, 500 Sepoys and four field pieces to join the Mysoreans at Seringham, where they arrived the day after Major Lawrence had entered Trichinopoly, and shortly afterwards this force was considerably increased.

It is unnecessary to enter into a detailed account of the various actions which were fought in the immediate neighbourhood of Trichinopoly, or of the attempts made to capture the town and citadel during the two years the investment lasted. It will suffice to say, that the Swiss, under Captain Polier, on several occasions rendered important service, and that at the commencement of the action at the Sugar-loaf Rock on the 12th May 1754, in which the French were defeated, Captain Polier commanded, in the absence of Major Lawrence, who had been obliged to go into the city the day before on account of indisposition. But after having been twice wounded, he was compelled to make over the command to Captain Caillaud, who had arrived in camp on the 16th of the previous September. There were, moreover, several Frenchmen serving

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in the ranks of the English, and it was owing to one of these men that an attempt made by M. Bernier, who commanded the French, to ascertain the height of the walls of the citadel, and to communicate with the French prisoners confined in the city, was discovered and frustrated.

Although the two nations were at peace in Europe, the English and the French on the coast of Coramandel had been engaged in hostilities for nearly five years. The Court of Directors of the English Company, anxious to put an end to this anomalous and wasting warfare, had in 1753 made an earnest appeal to the British Government for aid, either to terminate or continue the war, which they were unable to do with their own resources, backed as the French were by those of France.

The English Ministry, perceiving the necessity for interfering vigorously, at once entered into negotiations with the French Government on the subject. But finding that, under pretence of negotiating, the French were endeavouring to gain time, a squadron of men-of-war and a military force were dispatched to India. This vigorous resolution convinced the French that a perseverance in their policy would involve the two nations in war, for which they were wholly unprepared. They therefore dispatched M. Godeheu, one of the Directors of their East India Company, to Pondicherry, with orders to supersede M. Dupleix, and to negotiate a peace with the authorities at Madras.

On the 2nd August 1754, M. Godeheu landed at Pondicherry and assumed the administration of the government. Immediately after his arrival he acquainted Mr. Saunders, the Governor of Madras, with the intention for which he was sent to India, and as a proof of his desire to accomplish it, sent back to Madras the company of Swiss soldiers which M. Dupleix had captured, as they were going from Madras to Fort St. David, in massoola boats, in August 1752.

The two Governors entered into a correspondence, and both seemed desirous of agreeing to a suspension of arms, but until its terms should be concluded they determined to lose no advantage in the field.

After the action on the 12th May 1754, the French, fearing to attack the English in their camp, over-ran the neighbouring countries, and at last entered the dominions of the king of Tanjore. Major Lawrence, expecting that this would convince the king of the necessity of joining the English, and in order to take advantage of the first impression that these hostilities might make upon him, augmented the garrison of Trichinopoly to 400 Europeans, and marched with the rest of his force to Tanjore; shortly after his arrival at which place, he was joined by 240 men of the Madras European Battalion, 80 of the Bombay, and 200 Topasses from Madras.

Having succeeded in inducing the king of Tanjore to join the English with a contingent of 2,500 Cavalry and 3,000 Infantry, Major Lawrence, taking with him a large convoy of provisions, set out to

return to Trichinopoly ; and on the 17th August 1754 entered the plain to the south of that place, with the intention of reaching it by passing between the French Rocks and the Sugar-loaf Rock. The French had 900 Europeans and 400 Topasses in Battalion, 5,000 Sepoys and 10,000 Mysorean and Mahratta Cavalry, and were commanded by M. Maissin, who, on being informed of the approach of the English, marched to oppose them.

The action which ensued was almost entirely a cannonade, and not only had the English more guns than the French, but their Artillery was better served. The French, moreover, displayed great irresolution, which was imputed, not to want of courage, but to orders which it was supposed their Commander had received to avoid a general engagement. After sustaining considerable loss from the fire of the English guns, they retreated to their camp at the Five Rocks. Major Lawrence, however, was prevented from taking advantage of his success by a daring and successful attack made by Hyder Naik, afterwards Hyder Ali, Sultan of Mysore, on his baggage.

By some mistake, the rear guard of 100 Europeans and 400 Sepoys had quitted their station during the cannonade, and formed upon the right of the first line. The Tanjorine General likewise quitted the position which had been assigned to him for the protection of the convoy, and drew up his Cavalry in a separate body at a distance, in order to prevent the Mysoreans from falling upon the right flank of the army and the baggage. Hyder, perceiving the baggage left without proper protection, directed some of his troops to amuse the Tanjorines in front, whilst he himself with another body galloped round the French Rock and fell upon the rear of the convoy, amongst which they created no small confusion and seized thirty-five carts, some of them laden with arms and ammunition, and others with baggage belonging to the English officers. As soon as Major Lawrence discovered the mistakes which had led to this disorder, he ordered the rear guard to march back to their station, but before they arrived the enemy had carried off their booty. Some time was spent in collecting the scattered bullocks and coolies, after which the army continued its march and encamped near the walls to the south of the city.

In this action, which is known by the name of the battle of the French Rock, the loss of the English was 8 Europeans killed, amongst them Captain Pigou, an officer of spirit and ability. The French are said to have had nearly 100 men of their battalion killed and wounded.

On the 10th September 1754 a squadron of men-of-war, under command of Admiral Watson, arrived at Madras, having on board H. M. 39th Regiment, 700 strong, commanded by Colonel Adlercron, 40 of the King's Artillerymen, and 200 recruits for the Company's Battalion. The French, during this season, were reinforced by 1,200 men, of whom 600 were a body of Hussars under the command of Fischer, a partisan of some reputation, but the rest were merely recruits.

At this time the troops maintained by the English and French Governments on the coast of Coromandal were nearly equal, each consisting of about 2,000 Europeans and 10,000 Sepoys, but the quality of the English soldiers was so much superior to that of the French, that there is no doubt that if the war had continued, the French would have been compelled to ask for peace under much less advantageous circumstances than the Presidency of Madras, in obedience to the orders they now received from England, were obliged to accede to. M. Godeheu was sensible of this disparity, and dreading the advantages which the English might derive from their squadron, he showed a moderation in his demands sufficient to induce Mr. Saunders to agree to a suspension of arms, before the terms of the treaty were adjusted. The allies were now included in this suspension, which was proclaimed at all places where the English and French had troops, on the 11th October 1754, and was to last until the 11th January 1755. On the 26th and 31st December a provisional treaty of peace between the two Companies was signed. It was not, however, to be deemed definitive, until it had received the approbation of the two Companies in Europe, who had reserved to themselves the power of annulling the whole, or any portion of it.

By this treaty the French were allowed to retain the revenues of all the territories gained by them during the war, and which, according to their own account, amounted to Rupees 6,842,000, whereas the annual amount derived by the British from their conquests amounted to no more than Rupees 800,000. It had likewise been stipulated that there should be an exchange of prisoners, as far as the numbers taken by the French would admit. But here the English had the advantage, for when the treaty was signed 900 Frenchmen were prisoners of war, whilst only 250 of the British were in the enemy's prisons, so that after the exchange had been carried out 650 French prisoners remained in the hands of the English. The latter, moreover, deemed that they had obtained a great advantage by the removal of M. Dupleix from the Government of Pondicherry.

Before the conclusion of the peace, the Swiss, who had originally been sent to Madras, as well as those who had come from Bengal, were incorporated in the Madras European Battalion.

It now remains to give an account of the company of Swiss commanded by Captain Alexander Zeigler, which had arrived in Bombay in 1752. They had hardly commenced their duties, when they found their soldierly pride wounded by insults and oppressions of various sorts, and their miserable pay afforded them insufficient subsistence. Discontent, neglect, insufficient food, and sickness, wasted their numbers, and a large proportion of the remainder deserted to the French, by whom they were received as brothers and fellow countrymen; as the places of those who deserted were filled up by Topasses, the Swiss Company soon became such only in name.*

(To be continued.)

* Bombay Quarterly Review, April 1857.

II.

BAZAARS AND CAMP FOLLOWERS.

BY CAPTAIN D. J. STEWART,

Quarter Master, 3rd Regiment N. I.

FROM many points of view the treatment of Camp-followers is capable of improvement, and when considering the subject, it will be convenient to divide it into the following phases of their life, viz., when in Cantonments and when in Camp.

From a sanitary point of view it has become almost a necessity to do something, for year by year whenever cholera breaks out, its first appearance is, with few exceptions, either in the Bazaars or amongst the Camp-followers of a Cantonment; so that if regarded merely from what may be called a budget-point-of-view, there would be economy in improving the sanitary condition of those who are, for good or evil, so intimately connected with the efficiency, or otherwise, of the combatant portion of our army.

But many of these Camp-followers may claim something more than a profit and loss consideration, for the present manner in which they may be said to scramble through life, and struggle most pitiaibly for existence, places them in a position to excite the generosity of the Government which they so diligently serve. Much has been done to reduce their number, more especially in British Regiments, but still more can be accomplished, and it must be remembered, that with better men there may be fewer of them. The first condition of success is thoroughly efficient control; all, whether paid by Government or supported by the troops, must be under control and be properly housed, clothed and fed.

To accomplish this as regards British Regiments, both Cavalry and Infantry, it would appear very desirable to consider whether the status and efficiency of the Quarter Masters of such Regiments might not be altered for the better. While expressing the highest praise to those who have by their unaided exertions risen to most highly creditable positions, and fully acknowledging how much good work is performed by the existing Quarter Masters who have risen from the ranks, it would appear that now the importance of the office requires officers of much higher qualifications.

If it is considered for a moment, for how many hours of a day the British soldier and the Artillery or Cavalry horse is dependent on the efficiency and energy of the Quarter Master, it will hardly be possible to over estimate the necessity of this officer being of precisely similar standing to the Adjutant of the Regiment—in short the example of the Native Army must be followed, and the Quarter Masters of British Regiments henceforth be mounted staff officers, the worthy representatives

of the Quarter Master General's Department in their Regiment, as much so as the Adjutant is of the Department of the Adjutant General.

Nor is this the only change. The present appointment of Cantonment Magistrate might well give way to that of Provost Marshal, the whole of cantonments being properly placed under Military law, instead of a mixture which is neither civil nor military.

In theory there should be no one in Cantonments who is not actually required there for a military purpose, and no houses except for such to live in. But as in many places there are others, and it would be very expensive now to disperse them and pull down their houses, a middle course open is to insist on all residents in Cantonments submitting to Military law. The health of the troops and their Military efficiency demands a total suppression of the equity and civil law which has most lamentably crept in of late years, and which is altogether adverse to control or proper sanitary conditions.

Of the exact proportion of Camp-followers to combatants, with all their duties, it would be very tedious to write in detail. The general principle maintained is that those actually required having been determined by a Military commission, they should be properly housed, fed and clothed.

Next comes the subject of Bazaars, with their residents; and here, I am well aware, the present spirit of economy renders much action difficult. But there is sad overcrowding in all Bazaars, and will be until every house is subjected to periodical inspection, which must be made a condition of life under Military law; nor is it objected to after the first squeamishness is got over and its sanitary advantage properly explained. The number of drones hanging about Military Bazaars and lines, requiring to be fed, clothed and housed—which they all are most imperfectly—urgently requires reduction. The suggestion, however, which it is most desired to bring forward, is the gradual introduction of markets in every Cantonment throughout India.

The vendors in such markets could for the most part live away from cantonments, bringing their goods daily for sale, and in this way Bazaars would gradually collapse and disappear. But while they remained, each house should be registered to contain so many inhabitants, never to be exceeded under heavy pecuniary loss.

The custom of allowing married sepoys and camp followers to reside in Native Regimental Bazaars is inconvenient on all accounts, and it is very desirable to limit the number of both classes who can be married.

All these matters are at present, comparatively speaking, unrecognized, and it is only when sickness breaks out that the mode of life of these Camp-followers, even the existence of some of them, comes to light.

But unpleasant as the life of Camp-followers is in Cantonments, it is much more serious when they are moved into Camp ; they go somewhere, live somehow, drag themselves after the army in some way or other, often exciting the admiration of those they serve by their faithful service under most trying circumstances, but are ready at a moment's notice to develope pestilence which may place in jeopardy the lives of the army they follow. It is hardly any exaggeration to state that their lives are a continual struggle with disease in some form or other, and will not cease to be so until they are properly looked after.

In conclusion, the following questions are put forward as a means of leading to a practical discussion of the subject under consideration :—

- Q 1. Is it possible to disconnect grass cutters from Cavalry and Artillery and supply them with hay stored by the Commissariat ?
- Q 2. Is it possible to form all Camp-followers into a Corps ?
- Q 3. To what extent can Markets replace permanent Bazaars ?
- Q 4. Is it not desirable to form in each Presidency, a Model Cantonment ?
- Q 5. Would it not be advisable to offer large rewards or prizes for machinery to work punkahs in use throughout the Barracks ?—thus abolishing the fringe of coolies surrounding them.
- Q 6. Seeing that Native Troops, on service, are supplied with their food by the Commissariat Department, might not they be so served in peace ?
- Q 7. To what extent could the present Civil Police in Cantonments be replaced by Military Police, formed from the troops or pensioners ?
- Q 8. Is it not most desirable that the very important post of Provost Marshal in time of war, should be made no less so in time of peace, replacing Cantonment Magistrates ?

III.

REPORT ON THE REMOVAL OF THE "CITY OF EDINBURGH,"
SUNK OFF THE "SANDHEADS" IN OCTOBER 1874.

BY LIEUTENANT A. O. GREEN, R. E.

In the month of October, 1874, the Bay of Bengal was visited by one of those periodic storms called "cyclones," which are usually the cause of so much damage to the shipping in the Bay, especially when the ships happen to be overtaken by the tempest in the neighbourhood of the entrance to the mouth of the river Hooghly. The entrance to this river, leading to Calcutta, is a network of sandbanks, and its navigation is at all times a service of danger. The seaward tails of these banks are called the Sandheads, and are buoyed and lighted with extraordinary care and vigilance. To the S. W. and S. of these banks there is open sea, and it is here that vessels coming into the Port of Calcutta take their pilots on board.

It was during this cyclone that the two ships "City of Edinburgh" and "French Empire" came into collision and foundered. The "City of Edinburgh" was an iron-built ship of very strong construction, being built in compartments. She was about 1250 tons burden, and at the time of her foundering contained a very valuable assorted cargo, chiefly of stationery and piece goods. She belonged to Messrs. Smith & Sons of Glasgow. On coming into collision with the "French Empire" she foundered at once, her crew escaping on board the latter vessel, from whence they saved themselves in the ships' boats with a loss of thirty-two of their number missing. The "French Empire," a large wooden-built merchantman in ballast, was also lost, but she remained above water for more than half-an-hour after the collision. They both sank close to one another, right in the fairway of the eastern channel leading into the Hooghly river.

In December 1874, the "French Empire" was removed by Lieutenant Broadbent, R. E., but the "City of Edinburgh" still remained as a serious obstacle to navigation, and it was deemed advisable to have her removed before the commencement of the S. W. monsoon.

On the 26th February 1875, I received orders to place myself in communication with the Master Attendant of the Port of Calcutta, with a view to the removal of the wreck. It being deemed advisable to visit the wreck prior to taking any steps for her removal, I proceeded on the 27th February down the river to the position of the wreck, a distance of 124 miles from Calcutta, in the "Enterprise," which had been detailed for this service.

The wreck was found to be lying (vide sketch No. 1.) in $6\frac{1}{2}$ fathoms at low water, with her head N. W. by N., the Eastern Sea reef buoy bear-

ing N. N. W., and the Eastern Channel light ship E. by S. $\frac{1}{2}$ S. Her lower masts were visible out of the water to a height of about 8 feet below the crosstrees, and the foretopmast was still standing when the "Enterprise" arrived off the wreck. Divers were busily at work recovering her cargo, and to facilitate their operations, stagings had been rigged upon the crosstrees of the fore and mizen masts. A derrick had also been rigged up on the foretopmast to hoist up the cargo, as it was recovered, into rowboats made fast alongside, and from thence it was transferred to the wooden ship "Indian Merchant," which was anchored about 350 yards to leeward of the wreck.

On the day following soundings were taken over and round the position, and an average of $6\frac{1}{4}$ fathoms was found between the fore and mizen masts, and $6\frac{1}{2}$ fathoms astern of the mizen. Outside the wreck, the soundings gave $6\frac{1}{2}$ fathoms on the starboard, and $6\frac{3}{4}$ fathoms on the port side, showing that the sand had become heaped up round the hull to within $1\frac{1}{2}$ feet on the starboard quarter and 3 feet on the port, of the level of the deck. Soundings at a short distance from the position of the hull gave 8 fathoms over the general level of the sea bed.

Sketch No. 2 is a section of the vessel through her mainmast, showing the way in which the hull had sunk into the sand, as well as the manner in which the sand had silted up around her.

An iron yard, shown in sketch No. 3, had been made fast on the mainmast at the cap of its lower mast, and guide lines were passed from both ends to the fore and mizenmasts. From the great inclination of the mizen, and the taughtness of its guide line, it was concluded that the ship had ported as shown in the sketch. The fore and main masts were hollow iron masts, but the mizen was of pine wood.

After a careful examination of the wreck, and making inquiries of the divers as to the position of her hatches, &c., a portion of the "French Empire," which had lately made its appearance above the surface of the water, was next visited.

This consisted of the "French Empire's" wooden foremast, the heel of which was projecting some ten or twelve feet above the water, and formed a very dangerous obstacle indeed to the navigation. Soundings were taken all round it, and gave an average of 8 fathoms. It was evidently caught by the rigging at the crosstrees in some of the debris of the hull, and required to be removed by force.

The "Enterprise" returned to Calcutta on the 28th February, and it was recommended that as the deck was at such a distance below the surface of the water as to offer no obstacle to the free navigation of the channel, that the masts alone should be removed, and this it was proposed to do by introducing small charges of gun-cotton down inside the iron masts to a level with the deck, and to remove the other obstructions by means of gunpowder. This would have been a very economical way of removing the obstruction, as the caps of the iron masts

being out of water, the tops could easily have been opened and the charges introduced.

There was, however, no gun-cotton available for this particular purpose, so arrangements were made for carrying out the work entirely by the means of gunpowder. The following cylindrical iron cases had been previously made up in the Government Dockyard to hold charges of powder, and had been tested up to 30lb. pressure, viz., two to hold 400lbs. each, three 250lbs. each, and four 150lbs. each. In addition to these two more, to hold 650 lbs. each, were made up as quickly as possible. All preparations were completed by the 4th March, but no vessel could be obtained for the transport of stores, &c., to the site of the wreck until the 19th, when the steamship "Celerity," Captain Beresford, was detailed for this purpose by the Bengal Marine Department. This delay was of very serious consequence, as towards the end of March the S. W. monsoon with strong flood tides generally sets in, which would render working under water very difficult, if not impossible. As it was impossible to obtain the services of a diver for anything like a reasonable price, one man asking as much as Rs. 1,500 and all apparatus to be found him for the job. The steamer therefore left Calcutta at noon on the 19th March, without one. At Hooghly Point, the River Surveyor came on board, and anchor was dropped for the night close to the survey brig. After some little delay and difficulty a river rowboat, a kind of small clumsy barge, used in the survey work, was procured to assist in the work, and the following morning the steamer proceeded down the river with this boat in tow.

The wreck was reached about 4 P. M., and it was found that the foremast had disappeared entirely, having most probably fallen over with the fore part of the hull abaft the place where the ship had been cut down when she was run into by the "French Empire." All stagings, &c., had been removed by the crew of the "Indian Merchant," when she returned to Calcutta, having worked at the wreck until the setting in of the monsoon rendered the operation too dangerous.

There was a considerable swell on, and a fresh breeze blowing from S. W. when the steamer arrived ; but it was determined to commence work at once, as at this time of year there was every fear of its getting worse, and calm days are the exception and not the rule. Accordingly the two largest cases, containing 650lbs. of powder each, were placed in the row-boat. An attempt was made to mark the exact positions of the main and fore hatchways, into which it was intended to introduce the charges if possible, by long bamboos weighted at the end with iron kentledges. This, however, failed, owing to the inability of the crew of the jolly boat to get near the masts with them on board in such a heavy swell. They were therefore cast adrift and a rope was made fast to the mainmast. The row-boat now came down from the steamer with wind and tide, but was quite unmanageable in the seaway, and nearly ran on the mast. A rope having been passed from the jolly boat, the row-boat was brought up and made fast by her cable to the mainmast.

The cable, however, soon parted, and the boat began to drift to leeward. The anchor was then dropped and the steamer signalled to take her in tow, as it had become too dark to continue operations that night.

On Sunday, the 21st, the steamer ran down to the "Colleroon," pilot brig, and borrowed an anchor for the row-boat, as her own kedge was not sufficient to hold her. The weather having moderated considerably, no time was lost in getting back to the wreck. A cable was passed from the row-boat to the mainmast, and the anchor let go about 250 yards from it. The crew of the row-boat were unaccustomed to being in rough water and worked with difficulty, and the steamer's mate, who was in charge, being utterly ignorant of either Hindustani or Bengali, much valuable time was lost in hauling up into position. In fact two hours of the top of the ebb tide were thus lost, the time which had been calculated upon for lowering the charges into their respective positions. As soon as the boat was in position over the deck of the wreck, about where it was thought that the main hatchway was situated, one 650lb. case was made fast by a block and tackle previously fixed to the cap of the mainmast and hauled overboard, being steadied at the same time by guide lines fastened round the box of the case. It was, however, immediately carried away by the strong flood tide now running in, and after repeated attempts it was found impossible to lower it down into the main hatchway, as had been originally intended. It was therefore hauled inside the rigging of the mainmast on the port side and allowed to sink on to the deck in $6\frac{1}{4}$ fathoms of water. Everything was then cast off, and the row-boat allowed to drift away for about 200 feet, when the charge was fired by 20 cells of Walker's Firing Battery. The effect of the charge was excellent, the mainmast being lifted bodily out of the ship, and thrown some distance into the air, when it fell into the water and disappeared. The column of water thrown up was not very large, perhaps 30 to 40 feet in height, but the lateral and downwards effect in breaking up the ship must have been great. Portions of the deck and cargo came to the surface, and there was a strong smell of turpentine diffused through the air, showing that the turpentine tins in her hold, which formed part of the cargo, had been destroyed.

A cable was next made fast to the mizen cross-trees and the row-boat was hauled into position. A similar charge to the last was got *ready for lowering*, and this time a running bowline was passed round the mast below the futtock shrouds and inside the rigging. The charge was lowered into the water by means of tackle, and then made fast to the bowline, a task of no small difficulty with a rise and fall of from 6 to 8 feet in the waves; but the native lascars, when once they had it explained to them what was required, worked very intelligently and with great willingness. The charge having been made fast, was allowed to slide down the mast until the bowline caught in the belaying pin band, so that the charge just about touched the deck at the foot of the mizenmast. All was then made clear and the charge fired.

The mizen-mast was broken into four pieces; the upper portion with the cross-trees being broken off about 15 feet under the water, just above the belaying pin band, then two short pieces showing where the charge had been, and lastly the remainder of the mast down to the heel, which curiously enough remained standing upright with the jagged end just visible below the surface of the water, and did not fetch away until it was bumped by the jolly boat, when it came up bodily together with portions of the timbers. There were still some ropes holding the top and bottom pieces of the mast together, and these had to be cut before the cross-trees drifted away. The heel of the mast was held in position by some rigging underneath; but a hawser from the steamer being made fast round it, the whole of it came away directly the steamer went ahead.

The column of water thrown up was about 60 feet in height and immensely broad.

The work was finished most satisfactorily by 4-30 p. m., the River Surveyor sounding carefully all over the position and reporting all clear.

The destruction of this wreck would at this season of the year have been an impossibility, had it not been for the facilities afforded for lowering the charges into position offered by the masts which were standing. Had they not been there it would have been mere waste of time to have tried to have lowered the charges in such a powerful current, which was running at the time nearly seven miles an hour. As it was, the work was comparatively easy and carried to a satisfactory conclusion without the aid of a diver in a very short space of time.

The foremast of the "French Empire" had worked itself clear since the visit paid in the "Enterprise" at the end of February, so that the whole of the work was brought to a close with the removal of the "City of Edinburgh."

The "Celerity" returned to Calcutta on the 23rd March, after placing the Pilot's Ridge Light ship in position.

IV.

A SUGGESTION FOR A CHUNDA FOR BAGGAGE ANIMALS
IN A NATIVE CAVALRY REGIMENT.

It is necessary, nay, it is imperative for the efficiency of a Native Cavalry Regiment that its baggage animals should be in proportion to its wants, and also of a quality to supply all the demands called from it on active service.

By baggage animals I mean the baggage ponies and mules.

By the present system in existence, each man is supposed to have a pony to himself, and "Jore-wals" a pony between them, each Non-commissioned and Native Officer one each; this is all very well, but a man on discharge may take his pony with him, for some reason or another there may be great mortality amongst the regimental ponies, the exigencies of service may render a great many useless; how are the men who are already under heavy cuttings to supply them from their own means,—they may receive advances, but then these advances have to be liquidated, and all these cuttings, though of course necessary, are looked on by the men as onerous, whereas by making them understand that on enlistment they will be required to deposit a certain sum as a Tattoo Chunda and pay a small monthly subscription to its support, I think it would not be regarded with disfavor and would be of great benefit. It would enable a C. O. to have a really good establishment of baggage ponies, it would be reliable on active service, and moreover place at his disposal means for purchase of animals in place of those rendered unserviceable.

All ponies being regimental and not individual property, the men to whom they are allotted having care of them and being made responsible for them as in case of their horses.

I will now submit my plan in detail, in the hope that something may be done to render this most important part of a Native Cavalry Corps really efficient to stand the wear and tear of active service.

I would suggest the making of a Tattoo Chunda, the joining of which should be obligatory for all the native ranks of a regiment. The Chunda should be formed by donations and supported by monthly subscriptions.

First, I will consider what is to be done with the ponies at present the property of the men. These should be purchased for regiments at a valuation by a Committee composed of Ressaldar Major President and each Troop Officer Members; the money adjudged to each man should be paid to him minus 10 rupees, which I propose as a Sowar's Tattoo

Chunda donation, minus 16 rupees for a Duffadar, and minus 20 rupees for a Native Officer. Now let us see what such donations amount to.

13 Native Officers,	@ 20	...	Rs. 260	0	0
54 Duffadars,	@ 16	...	" 864	0	0
6 Trumpeters,	@ 16	...	" 96	0	0
420 Sowars,	@ 10	...	" 4,200	0	0

Total, Rs. 5,420 0 0

This will form the main Tattoo Chunda and be supported by monthly cuttings at the following rates, which I consider will support the Fund and yet not be severely felt by the men :—

Tattoo Chunda deductions from 13 Native					
Officers, at 1 rupee per mensem,	...	Rs. 13	0	0	
Do. do. from 54 Non-commissioned					
Officers at 8 annas per mensem,	...	" 27	0	0	
Do. do. from 6 Trumpeters at 8 annas					
per mensem,	...	" 3	0	0	
Do. do. from 420 Sowars at 4 annas					
per mensem,	...	" 105	0	0	
Total			Rs. 148	0	0

This sum monthly will give 1776 rupees a year, which, in my opinion, will handsomely support the Fund and supply all demands.

Now let us see what the purchase of the ponies now belonging to the men will come to ; suppose we say that there are 210 ponies in a regiment, which I think is a fair average number, and say the average price is 25 rupees, *i. e.*, deducting the amount of each man's donation in the scale alluded to, then the price of all together will be 5250 rupees. Let half of the sum be given by Tattoo Chunda and half by regimental chest as an advance to be repaid as the Tattoo Chunda grows richer, which it will do monthly.

Such is roughly my idea of raising a Tattoo Chunda, which will enable a regiment to ensure its baggage establishment, as far as the men go, being as perfect as possible. No pony to be bought unless passed by C. O. or other authorized officer. No pony to leave the regiment, the men on discharge receiving a refund from Tattoo Chunda to amount of their donation, as in case with Horse Chunda. A man neglecting his pony to be dismounted ; if his pony die, or has to be cast through his neglect he should be fined to amount of value of animal, or at discretion of C. O. The purchasing of ponies to replace those cast and short, to be left to discretion of C. O., who will either buy them as advantages offer, or send a party for their purchase or through the men, but no pony to be taken by the latter way unless it has first of all been approved of by some authorized officer.

I would suggest that each European Officer should have two good baggage ponies or mules ; he is ordered to have a tent, so also he should have ponies, one pony for a small Shouldari tent, the other to carry his personal baggage ; this I consider ample on active service, indeed it could be lessened by two officers chumming together in one tent. Such is a brief outline of the plan I have suggested, and having seen the working of the old system several years I feel confident that the change proposed will be for the best, and will render a regiment ready to take the field at once, which under the present system is doubtful, for though it can be done even now, still a great deal of bund-o-bust has to be made, and even then some men are without baggage animals.

My plan must speak for itself. I have endeavoured to put it as plainly as possible. Being a sincere wellwisher of the Native Cavalry, I beg to sign myself,

A PIFFER.

V.

THE ESTABLISHMENT OF A REGIMENTAL SYCE FUND
IN A NATIVE CAVALRY REGIMENT.

HAVING lately discussed the subject of baggage ponies I will say a few words regarding the syces and grasscuts of native cavalry regiments, always a source of trouble in a regiment, always deserting, getting ill, &c.

The system now in vogue is that either each man should have a syce of his own or should have a syce and pony with his "Jore-wal," the syce being the servant of the sowar who gives him his regular monthly stipend, he supplies him with kurpa, net, pack saddle, &c. The man gets ill, the sowar loses his services, and has to buy his grass, the man himself almost a beggar if ill, is wretchedly clothed and can scarcely keep himself alive without assistance.

Now, I will propose a course that will ensure a better class of men taking service as syces. Through having a stake in the regiment, few would bolt and, if ill, could be supported in hospital and be no burden on the sowar, would also form a fund to supply a syce with all materials to follow his calling as grasscut.

I would suggest that a sum of rupees 5 be deposited by every syce in the regiment belonging to the native ranks, which should be forfeited if he deserts, but returned to him if discharged, to his estate if deceased; a cutting from his pay of 1 anna a month should go to a syce fund, to be applied to their wants when ill, or in cold weather, when extra clothing is necessary (these wretched men die in great proportion to their number, simply because they starve themselves, are ill fed and ill clad).

Suppose there are 300 syces in a regiment,

there may be more, there may be less, still

it is a round number, each man to deposit a

sum of 5 rupees, this will give a sum of Rs. 1500 0 0

Each man to subscribe 1 anna per

month, " 18 12 0

In the year, " 225 0 0

This will form a first rate fund and should be applied as follows:—

- (1) A syce, on taking service, should be supplied with a "kurpa," grass net, a good stout blanket and pack saddle.
- (2) In cold weather he should be supplied with extra bed clothing and a good warm "mirzai" for himself.
- (3) When in hospital, if his case required extra care, nourishment and clothing, it should be supplied by the fund, on representation by the doctor.

- (4) The sowar, to compensate him for the loss of the services of his syce, should have the expense of his buying grass during the time his syce is ill, refunded to him from the fund.

If the syce deserts or steals or is turned out for disgraceful conduct, his deposit to be confiscated.

If discharged, his deposit refunded to him.

If he dies, the deposit to be accredited to his estate.

The fund to be called the Regimental Syce Fund.

The accounts kept and balanced monthly by some Officer authorized by C. O. to do so, and inspected by C. O. monthly.

The advantages that will be accrued from such a system are,—

- (1) That a better class of men will be got as syces.
- (2) That having a certain stake in the regiment, and drawing certain benefits from it, they will not care to desert.
- (3) That with these benefits they will not grudge the 1 anna per mensem.
- (4) That it will to some extent relieve the sowar of a certain amount of dead loss if their syces are ill.
- (5) That it will be a source of a certain amount of contentment between the sowars and their syces.

By the present system there is constant trouble and complaint and causes of soreness between the sowars and their syces.

I feel sure that such a system will greatly add to the well-being and efficiency of a regiment, and mitigate a constant source of trouble and annoyance to C. O.

The greater the number of syces the better the fund, and when once it becomes known and appreciated, I feel sure there will be no difficulty in inducing good men to take service as syces, which cannot be said to be the case now.—Again,

A PIFFER.

VI.

A FEW REMARKS ON SOME OF THE MINOR DETAILS
CONNECTED WITH A NATIVE CAVALRY REGIMENT.

RECRUITING.

I have heard it said by several Commanding Officers, that recruiting now-a-days is difficult, and that the stamp of men is different to that obtained in former days, that the pay of the ryot is now so good that they will not and do not care to take the shilling.

Now, in my humble opinion, if we managed the recruiting in another way, I think we might induce men to enlist. The course I would suggest is as follows. Whenever a regiment is in want of men, let it send a party under an English officer, with a Native officer of influence and well known in the class that is required, to the district from which the class of men required are obtainable. Let the Commissioner of the district make proclamation, that a party of such and such a regiment is coming for the purpose of recruiting. Let the party themselves make a great display, hold tournaments, *i. e.*, Neza bazi and other games, and give prizes to the best performers, and use every effort to enlist men who are good riders and can use their weapons.

The officers should have authority from the Commanding Officer to make a respectable man of good family a non-commissioned officer on the spot, "*pour encourager les autres*," the party should visit fairs and other places where bodies of men are assembled together. Let all the party wear full dress with recruiting ribbons on their puggies. I feel sure such a plan would succeed in obtaining men of the right sort. A party for Pathan recruits should be all Pathan men of some standing; the English officer too should be able if possible to speak Pushtoo. I think, nay I am sure, good and plentiful recruits could be obtained in this way. The following classes make the best cavalry soldiers :

Jat Sikhs.

Pathans from Peshawur valley.

Hindustanis, Rangurs and Pathans.

I would not recommend either Khuttucks or Dogras being enlisted as Cavalry soldiers, but they make first rate Infantry; they can seldom ride, and the former are very home sick and cut their names if far from their homes.

PURCHASE OF REMOUNTS.

In this matter my remarks tend especially to Punjab Cavalry regiments. I have noticed, from attending horse fairs, that the competition is now so great, parties from so many regiments being present, that unless the Chunda of a regiment is very well off, it cannot afford to buy the best horses, and is obliged to put up with very second rate ones, with which, even at the time, the purchaser is dissatisfied, but is obliged to buy, the regiment perhaps being in want of remounts. If the

best horses are bought, much more than the Regimental Chunda has to be given, the Chunda money is run out, and the men have to be put under severe cuttings to pay for their horses, it being altogether a source of trouble and anxiety.

Along the Punjab frontier there are places where an excellent breed of horses can be obtained ; so good indeed in all the requisites for troopers that if I ever commanded a regiment I should wish for nothing better. The down-country horses cannot touch them in hardy enduring qualities. On the Frontier there are the following descriptions of horses:—the Biluch, Waziri, Lungur and Kutchi ; they are somewhat difficult to get in any numbers at present, for the reason that few regiments have ever bought numbers of them, and the owners do not like to bring their cattle long distances for sale, and then have their nags rejected and disparaged perhaps from the mere caprice of an officer who does not know a horse when he sees one.

If these owners saw that horses were in demand and purchased, I feel sure a great number would be purchased yearly, and would suggest the following plan: whenever a regiment was in want of horses, instead of sending men to Butasir and elsewhere down-country, get the Commissioners of the various districts to proclaim the coming of a remount party for purchase of horses. I feel sure that after one trial, if several horses were bought, the owners would always sell. Some of the Biluch and Waziri mares are so good, that Government stallions, which are kept at every station, could be put to them, thus producing good foals for future regimental purposes. During the time my regiment was at Bunnoo, we bought several excellent horses of the Waziri breed, and they are doing excellent work up to the present period ; most of them were got cheap, an average price of 180 rupees ; the best nag I ever had I got at Bunnoo and she was a Waziri mare. The Biluch, Waziri, and Lungur breed are splendid for Cavalry purposes, hardy, enduring, with beautiful sound feet ; they are somewhat fiery to ride, but make first class chargers. I do not think the plan I suggest has ever been tried. I feel sure it would pay a regiment to try it ; if it succeeded the gain would be great, not only in providing an excellent local depot for our wants, but it would also encourage the owner and dealer to sell largely and improve the breed of horses on the frontier. I would earnestly suggest a trial of my plan.

REGIMENTAL BOOKS, PAPERS AND RECORDS.

Let any one look down the list of books in an adjutant's office and remark the appalling number of them. I purpose making a few suggestions which will decrease their quantity without in any way doing away with their advantages ; such curtailing of quantity will reduce the weight of a Regimental Office, also the number of camels required for carriage. I may have left out some, but others may think of reducing the number of some I have left out. Instead of the Record of officers services now in Adjutant's offices and kept by Adjutants, I would suggest

that each officer should have a little book, which should contain all the information now in the Adjutant's hand ; each officer should make his own entries, and be responsible for them ; and the books should be shown at inspections with other officers' books.

The Long Roll, Kindred Roll, Horse Roll and Service Register—each of these records are in separate books as above, causing bulk, space and weight on the march ; but all these records are important ; it will be seen how I combine them all into one ; instead of entries into four books, entries into only one, all particulars regarding a man are at once available and at present in a neat compact form.

This book should be made of parchment leaves like a guard book, and, the leaves being able to be taken out, it should contain only the men actually on the strength of the regiment ; the sheets of all discharged men being kept in a separate book. Each man's sheet will contain all the information now taken up in four books (see facsimile.) I would recommend for use on service that each man should have a small book in his own possession ; to be shewn at weekly inspection. All entries to be made by Squadron Officers in English, and it should contain information as to the man's age, enlistment, residence, occupation, next of kin, his standing monthly as regards amount of batta, his services, medals and general character. It should also contain a discharge certificate, which when discharged should be filled in, and the man allowed to take the book away with him, his sheet before mentioned being kept as regimental record. These books to be inspected monthly by Squadron Officers, and quarterly by the Commanding Officer.

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REGIMENTAL RECORD BOOK.

Regimental No. 1560, Sowar Ram Singh, Caste Jat Sikh, 1st Troop, 1st Squadron, Captain Jones.

Date of Enlistment, 30th March 1860.

Age at Enlistment—20 years.

Resident of village Chobal, pergunnah Tara Tara, district Umritsur, occupation Zemindar.

Date of promotion to	Lance Duffadar.....
"	" Duffadar.... ..
"	" Kote Duffadar.....
"	" Jemadar.....
"	" Ressaldar.....

Date of discharge or Pension.....

General Character.....

WAR SERVICES.

KINDRED ROLL

Relations in the degree of relationship.	By whom it is desired the es- tate should be inherited.	His or her resi- dence and occu- pation and other particulars.	By whom it is desired the As- sami should be inherited.	His or her occu- pation, residence and other parti- culars.	REMARKS. Here should be entered the Squadron Officer's signature to all entries and revisions.
Son	1	..			
"	2	...			
"	3	...			
"	4	...			
Father	...	...	
Mother	...	...	
Daughter	1	...			
"	2	...			
"	3	...			
Brother	1	...			
"	2	...			
"	3	...			
"	4	...			
Sister	1	...			
"	2	...			
"	3	...			
"	4	...			
Uncle	1	...			
"	2	...			
"	3	...			

FURLOUGH REGISTER.

Date of going on furlough.	Duration.	Date of return.	Date of going on furlough.	Duration.	Date of return.	Remarks.

In these small books I would have printed in Oordu, Nagri and Gurmuki a short exhortation as follows:—

“Sowar—(man’s name)—you are a soldier in the service of Her most excellent Majesty the Empress of Hindustan, the greatest and most powerful sovereign in the World ; you are in a profession at once the most noble, honorable and glorious ; by steady and good behaviour, by your example, obedience and bravery, you can rise to the highest rank that Her Majesty can give you. She trusts in your perfect unassailable loyalty and courage under all circumstances, in all danger ; and recollect that the first duty of a soldier is *perfect implicit obedience*.”

Then should come the list of meritorious rewards for good conduct and bravery, i. e.

Good conduct pay.

Order of Merit.

Order of British India ; and with the particulars regarding each.

The pay of all native ranks ; a short abridgement of Chunda rules.

• His number, troop, squadron, Subaltern Officer’s name and Troop Officer’s name, age, date of enlistment, residence, occupation, monthly entries of his standing as regards amount of batta, his furlough entries, his general character, discharge certificate.

Then some useful hints as to his behaviour, appearance and how to take care of his arms, accoutrements and horse.

REGIMENTAL AND TROOP DEFAULTER SHEETS.

These are now separate and are contained in seven large bulky books.

Here I would suggest one regimental defaulter’s book, kept by the adjutant, to contain all entries of punishments, both minor and regimental ; the former in black and the latter in red ink ; then can be seen at a glance, what regimental entries a man has got. I would still retain the Punishment book, for rough entries during orderly room, and one would be a check on the other ; thus I save six bulky books.

REGIMENTAL LETTER BOOK.

Now into this book each public letter has to be copied by hand, which takes time, is an endless source of worry to Commanding Officer, Adjutant and Baboo, as, if the latter is hurried, he makes mistakes and a fresh copy has to be made. I would recommend each letter to be roughly drafted by Commanding Officer (there will be no cavilling at meaning, spelling or sense) the Adjutant to write them. Then after all the work is done before post time, for them to be copied into a book by Mordan’s copying press, either by the Adjutant himself or his Baboo. Each letter then is numbered with red ink and initialled by the Adjutant, to show

that the letter is copied and with his cognizance; thus time will be saved and no letters will be lost.

REGIMENTAL DARBAR OR ORDERLY ROOM.

By the present system a Darbar is held either every day or three times a week; during which the transaction of all regimental work taken place, complaints and requests are heard, defaulters roughed off, horses inspected, etc. All this takes up a great deal too much time. I have seen an orderly room under these circumstances take from 12 o'clock to 4 o'clock; this is hardly satisfactory.

I suggest as follows—Orderly room three times a week for taking reports, roughing off defaulters and regimental correspondence.

Once a week, say Saturday, an orderly room solely for inspection of sick horses, and horses for command or fund.

Other days, Squadron reports to be taken by Squadron Officers, who should keep all important matters for the Commanding Officer's Darbar. This is a merely regimental matter, but the idea may perhaps be liked.

I am quite sure these few alterations suggested, will greatly decrease the number of books that are now kept up, without taking away from any of the information furnished by them; the entries will be just the same but in a much more compact form; all regimental books should be of parchment leaves, as more durable and lasting.

I offer these suggestions in all humility; having been several years an Adjutant I have some little experience as regards regimental books and such little details.

A PIFFER.

VII.

CATALOGUE OF WORKS ON CAVALRY.

The following list of works has been drawn up in the hope that it may prove useful to those officers who are desirous of studying the history, organization, or tactics of Cavalry. The list has no pretensions either to exhaustiveness or arrangement.

Cavalry, its history, management and uses in war, by J. Roemer L. L. D., New York, 1863.

Notes on Cavalry Service, by Captain J. C. Russell, 12th Royal Lancers, London, 1874.

Cavalry Compendium, by J. Congdon, Philadelphia, 1864.

The Cavalry Catechism, by Captain Robbins, London, 1865.

Hints on the Working and Duties of Cavalry, by Lieutenant Colonel Malcolmson, Kurrachi, 1873.

The Cavalry Manual, by Major Ainslie, London, 1843.

Instructions in Cavalry Drill, by Lieutenant C. W. Bowdler Bell, 5th Lancers, London, 1873.

Instructions for Cavalry Outpost Duties, Horse Guards, London, 1873.

Notes on Cavalry, by Colonel C. Fraser, 11th Hussars, Agra, 1871.

European Cavalry, by Major General McClellan, Philadelphia, 1861.

Austrian Cavalry Exercise, Translation by Captain W. S. Cooke, London, 1874.

The Organization and Tactics of the Cavalry Division, by Major General Walker, C. B., London, 1876.

Cavalry Outpost Drill, by Major General Smith, London, 1867.

Lecture on Mounted Riflemen, by Lieutenant Colonel Wood, London, 1873.

Lecture on Organization and Employment of Cavalry, by Colonel V. Baker, London, 1873.

The Book of Aids, or Catechism of the System of Equitation, Canterbury, 1869.

Cavalry at the Camp, by Major O. Barnes, Allahabad, 1873.

Remarks on the Organization of the Bengal Cavalry, by H., 1869.

Our Native Cavalry, by " Ghorchurra," Meerut, 1864.

The Dress and Equipment of Irregular Cavalry, Calcutta Review, 1846.

The Bengal Cavalry, Calcutta Review, 1855.

The French Cavalry in 1870, Translation by Lieutenant Thomson, London, 1873.

Cavalry Field Duty, by Major-General Von Mirus, Translation by Captain Russell, London, 1872.

A Proposed New Drill for the Manœuvring of Cavalry on a system without Pivots, compiled by " Light Cavalry," Madras, 1872.

Field Service of United States Cavalry in time of War, by Major-General McClellan, Philadelphia, 1862.

Standing Orders of the 10th Royal Hussars, London, 1873.

Outpost Duties, 10th Royal Hussars, London, 1873.

Memoir on Swords, by Colonel Marey, London, 1860.

Cavalry Tactics, or Regulations for United States Cavalry, by Brigadier-General Cooke, New York, 1872.

Treatise on Harness, Saddles and Bridles, by A. Davis, London, 1867.

Hints on Irregular Cavalry by Captain, Trower, Calcutta, 1845.

A Rough Sketch of the Rise and Progress of the Bengal Irregular Horse, by Captain Carmichael Smyth, Calcutta, 1843.

A Treatise on Brigade Movements of Cavalry, by Lieutenant Colonel Angelo, Calcutta, 1850.

The Annals of the Irregular Horse, Allahabad, 1874.

Manual of Drill for Mounted Rifle Volunteers, Horse Guards, 1863.

Standing Orders for India of the Fifth Royal Infantry Lancers, Sialkot, 1872.

United States Army Cavalry Tactics, New York, 1874.

United States Cavalry Tactics, Washington, 1841.

Mounted Infantry, by Captain Hogg, Bombay, 1874.

French and Prussian Cavalry, in the Battle near Vionville and Mars la Tour, Translation by T. H. Smith, Umballa, 1873.

Handy Book for United States Cavalry, by Brigadier General Cooke, Philadelphia, 1864.

Questions and Answers for Subalterns of the British Cavalry, by A. Tryford, 21st Hussars, London, 1866.

Part V of the new edition of the Prussian Cavalry Regulations, Translation by Captain Trench, London, 1875.

On the Employment of Field Artillery in combination with the other Arms, Translation by Captain Clarke, 1872.

Cavalry Memoranda, by Lance Corporal F. J. Carandini, 16th Lancers, Bangalore, 1874.

Drill and Manœuvres of Cavalry, combined with Horse Artillery, by Major General Smith, C. B. London, 1865.

Cavalry Sword Exercise, by Colonel George Greenwood, London.

Cavalry Sword, Carbine, &c. Exercise, Horse Guards, 1871.

Instructions for the use of Auxiliary Cavalry, Horse Guards, 1875.

Cavalry Swordsman, by Hutton, London.

The Training of Cavalry Remounts, by Captain Nolan, London, 1852.

Camel Guns, by Colonel Maxwell.

Memo. on the advisability of attaching Gatling Guns to Cavalry Regiments, Journal U. S. Institution, No. LXVI.

On Horsemanship, and the Duties of a Commander of Cavalry, Translation from Xenophon's Minor Works, by Watson, London, 1869.

History of the United States Cavalry, by A. Brackett, New York, 1865.

Modern Cavalry, by Lieutenant Colonel Denison, London, 1868.

Yeomanry Cavalry, by C. J. E., London, 1871.

Equipment Table for British Cavalry in India, 1873.

Unasked Advice, containing a Treatise on Light Horse, by "Impecuniosus," London, 1872.

Cavalry ; its History and Tactics, by Captain Nolan, London, 1860.

Treatise on Horse Shoeing, by W. Douglas, 10th Royal Hussars, London, 1873.

Advance Posts of Light Cavalry, Translation from the French of De Brack, by Major Begbie, Madras, 1850.

Russia's Advance Eastward, by Vincent, London, 1874.

Army Equipment, Part I. Cavalry, Horse Guards, compiled by Captain Hozier, 1865.

Our Native Cavalry, by " Ghorchurra," Meerut, 1864.

The Dress and Equipment of Irregular Cavalry, Calcutta Review, 1846.

The Bengal Cavalry, Calcutta Review, 1855.

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Outpost Duties, 10th Royal Hussars, London, 1873.

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Russia's Advance Eastward, by Vincent, London, 1874.

Army Equipment, Part I. Cavalry, Horse Guards, compiled by Captain Hozier, 1865.

- Field Days of the 2nd Life Guards, by Colonel Greenwood, London.
- System of Foot and Equitation Drills, by W. Bishop, 1846.
- Brigade and Divisional Movements of Cavalry, Horse Guards, 1863.
- Cavalry Regulations, Horse Guards, 1869.
- Movements of Cavalry, Horse Guards, 1875.
- Maidstone Book of Drills, Maidstone.
- Cornet's Assistant, by Lieutenant Turubull, Calcutta, 1848.
- Guide to Training Remounts, by Corporal Major Turner, London, 1851.
- Modern Tactics of the three Arms, by Major General Smith, London, 1873.
- Mounted Riflemen, by Lieutenant Colonel J. Bower.
- Correspondence on Mounted Riflemen, by Lord Elcho, London, 1873.
- Cavalry Equipment, by Major General Smith, London, 1870.
- The Use and Application of Cavalry in War, from the text of Bismark, by Lieutenant Colonel Ludlow Beamish, London.
- Cavalry Outpost Duties, by a Cavalry Officer, Secundrabad, 1874.
- United States Cavalry Outfit, Washington, 1874.
- Report on European Armies, by Major General McClellan, U. S. A. Washington, 1857.
- En Avant, Essays on Native Cavalry, by Major MacKenzie, Allahabad, 1874.
- Notes on the Handling of Horse Artillery and Cavalry, by Captain Ketchen, R. H. A. Journal Royal Artillery Institution.
- Trumpet and Bugle Sounds for Mounted Services, Horse Guards, 1870.
- Precis of Modern Tactics, by Major Home, London, 1873.
- The Armament of Cavalry, by Lieutenant Elliott, Allahabad, 1875.
- On Seats and Saddles, Bits and Biting, by Major Dwyer, London.
- Breeding of Horses for Military Purposes, by Captain Hozier, London.
- Historical Records of the British Cavalry, London.
- Cavalry Pioneers in the Austro-Hungarian Army, Journal United Service Institution of India.

Memorandum for the Guidance of Cavalry employed in Outpost Duty at Aldershot, by Sir Hope Grant, London.

Organization and Equipment of Cavalry, by Colonel V. Baker, London, 1873.

The Handy Horse Book, by a Cavalry Officer.

Mounted Rifles, by Lieutenant Colonel Acland, London.

Regulations applicable to the Corps of Yeomanry Cavalry, Horse Guards.

Cavalry Drill, by Patten, New York.

Notes on Horses for Cavalry Service, by Major Arnold, U. S. A., New York.

Organization of Irregular Cavalry, by F. Taylor, late 8th Hussars.

Remarks upon Cavalry, by Major General Warnery, translation from the German, London.

The Lorimer, Observations on Bridle-Bits, by B. Latchford, London, 1871.

Regulations for Cavalry, Horse Guards, 1865.

Cavalry Sword Exercise, Horse Guards, 1865.

Manual and Firing Exercise for the Snider Cavalry Carbine, Horse Guards, 1874.

**G. H. ELLIOTT, *Lieutenant,*
*3rd Bengal Cavalry.***

NOTICE.

MEMBERS of the Institution who have not already done so, are earnestly requested to pay their arrears of donation and subscription either to the Corresponding Member at their station, or direct to the Secretary at Simla.

Some members still owe their donation and three years' subscription.

Officers who may wish to become members are requested to be kind enough to forward their donations and subscriptions at the same time as they express a wish to join the Institution, and also to inform the Secretary whether their subscription is intended to be for the current year, which ends on the 31st May 1877.

Members can pay their subscription to the Alliance Bank, Simla, if more convenient, and the Bank will grant receipts for any money sent.

The entrance fee is 5 rupees and the annual subscription 5 rupees.

Members on changing their addresses are particularly requested to notify the change to the Secretary, in order that delay in forwarding the Journals may be avoided as much as possible.

The address book is corrected up to date from the Army Lists, but mistakes are occasionally unavoidable, unless members themselves promptly notify their change of residence.

Members proceeding to England on leave, who wish the Journal to be forwarded to them while absent from India, should inform the Secretary, and send stamps for the overland postage by Brindisi or Southampton as they desire.

When a member appears in orders for leave to England, his Journal is not despatched unless he asks for it, and while absent from India his subscription is not payable unless the Journal is supplied.

Members on return from furlough can obtain the numbers of the Journal that have been published during their absence, by paying the subscription for that period, and all members on returning to India should inform the Secretary of the fact at once.

The Secretary will be happy to send an Index to volumes I, II, III IV and V to any member wishing for the same.

H. H. STANSFELD, LIEUT.-COLONEL,

Secretary.

ORIGINAL PAPERS.

I

THE MILITARY CAPABILITIES OF COORG.

In these days of military reform, the Indian Army, its constitution, its 'morale' and its political value, have occupied no small share of the attention of people both in this country and at home. Our increasing responsibilities in the East and the uncertainty of the future with the Eastern question still unsolved, have forced upon people the conviction that the Indian Army is not all that it ought to be, that it is not the splendid military machine which good organization might make it, and which we trust we shall one day see it; and that it is merely a huge garrison army, fair to look upon, but incapable of bearing the strain of a great war.

We do not propose to discuss here the present condition of the army, nor to suggest any Utopian scheme for its reorganization. Such subjects are discussed in every messroom from Peshawur to Tonghoo, and infallible remedies proposed in every newspaper from Simla to Cape Comorin. Able men and accomplished soldiers have given these matters their earnest consideration, so we need not dilate upon them here. Our object in writing is merely to direct public attention if possible to one of the many sources of military strength which India possesses, and which we have so signally failed to utilize. India, with its teeming millions presents many varieties of the human race; within its limits may be found the weakest and most effeminate of mankind, as well as tribes the most warlike and hardy. Among the latter may be classed the Coorgs, dwellers in the mountains between Mysore and Malabar, and it is with reference to these brave people we are now writing. We believe firmly that it is by availing ourselves of such elements, that our position in this country may be strengthened and secured, and it is with this conviction upon us that we venture to advocate the utilization of this little known source of power.

In the Hill country of Coorg exists a race of men, as brave, hardy, and loyal as any in Southern India. The physique of these mountaineers is far superior to that of the natives of the plains. They are tall, handsome, strong and athletic. Of their bravery they gave ample proof when we annexed the country, and their loyalty has ever been such that they have been exempted from the provisions of the General Disarmament Act, consequently nearly every Coorg carries a gun in the use of which he is generally an adept. The Coorgs as a class are agriculturists and foresters; they delight in field sports, and their manner of life is such as to render them hardy and capable of very great exertion. Thus in this mountain race we have all the elements of the

warrior caste, valour, strength and loyalty,—the qualities most essential to the soldier. Moreover a great number of the Coorgs are Christians, and the wholesale conversion of the race at some future date is by no means improbable. Again, a reliable force in Coorg would from the very situation of the country be invaluable to us. It stands between Mysore and Malabar. On the one side we have Mysore and Seringapatam containing like all native cities many elements of discord, on the other Malabar with its fierce and fanatical Moplahs. At any moment troops might be required to overawe an excited city, or to extinguish the flames of rebellion in a revolted province. Troops can march from Mercara to Mysore in three days and from Verajapett to the coast in two.

Now it has often been said that the idea of military service is repugnant to the Coorg, that his attachment to his country is such that he could only with difficulty be induced to quit it, and that his domestic ties are such as to preclude the possibility of raising regular regiments. Much of this no doubt is true, and we fully believe that to form a corps on the model of the sepoy regiment would be decidedly a mistaken policy for the reasons stated above, but the Coorg is not really adverse to military service if it be offered to him in a form according with his wishes and sentiments. Were continual service not exacted, were he assured that he would not be required to leave his country except in case of emergency, the Coorg, we are convinced, would willingly enlist, and prove as trusty and able a soldier as any Sikh or Punjabee in the North-west Frontier Force. We believe then, that the true solution of this question, the employment of the Coorgs as soldiers, lies in the formation of a Militia Force.

A native Militia, being a novel suggestion, is one likely to meet with considerable opposition, and many objections to it will be raised. In the first place it will be contended that such an organization would be highly dangerous in a country like India. True, if applied to the inhabitants of the cities and plains, but not so, we think, in the case of hill races like the Coorgs. Their loyalty is undeniable, they have no sympathies with the dwellers in the plains, and their interests and ours are identical.

Again, it will be said that experience shows us that natives to be of any practical value require long and constant training, and that consequently money spent on a Militia would be utterly thrown away. In most cases this would no doubt be true, but we contend that we are here dealing with a superior race, imbued with a profound contempt for the natives of Mysore and Malabar, and with no slight confidence in their own prowess. Besides a Coorg force would in no conceivable case be required for long or harassing expeditions, nor for service against any well organized enemy. Such work as it might be required to do, the suppression of a city emeute, or the quelling of a Moplah revolt, a Militia force would be fully equal to, provided it were composed of brave men and ably led.

In fact for hunting down gangs of Moplahs, where could you find better men than these mountaineers, accustomed to a jungle life and inured to fatigue. We do not for a moment pretend that such a force would be superior or even equal to a regiment of Madras Sepoys in drill or discipline, but we do maintain that it would be far cheaper man for man, and more useful in such contingencies as those to which we have alluded.

Another objection would be, that Coorgs never do enlist and that therefore, however much we might desire it, we never should be able to raise a force from amongst them. To this we can only reply, that we have discussed the subject with several leading Coorgs, and with many of the Coorg planters, and that, from all we have heard, we are firmly convinced, that Militia enlistment would be popular, as by it the Coorg would never be absent from his home for any long period, and would never be required to leave his native hills except on active service.

Fourthly, the objection might be made that you never could get the people to leave their work and their fields for the training, but this fear is groundless. There is little or no work to be done in Coorg, in the two or three months immediately preceding the monsoon, the very time best suited for training, and at that season the Coorgs would willingly find their way to Mercara, their capital, especially if they could live there, as they would do by enlisting, without cost to themselves.

There are of course other objections to the scheme, but we feel convinced that the advantages attending it more than compensate for the disadvantages.

We will now proceed to lay down our propositions on this subject, merely giving a rough outline of the scheme, and leaving minor details to the imagination of those who may care to give a little of their attention to the matter.

The head-quarters of the Force should be at Mercara, where ample accommodation could be found if the Sepoy regiment were removed; the necessary buildings already exist, including even quarters for the officers, and no safer nor better place than the Fort could be found for keeping arms, ammunition and stores. Moreover Mercara is in a central position to which all the main roads converge. On enlistment the recruit should be put through a preliminary training of five or six months beginning in December or January, and lasting till the end of May, in which time he could be thoroughly grounded in all the essentials of the soldier's profession. It would be unnecessary to waste much time over deportment, marching past, and the more intricate evolutions of Infantry, but the recruit should be fully instructed in the use of his weapons, in rifle shooting, in company drill, in the simple and useful manœuvres of a battalion, in skirmishing and in executing hasty intrenchments; he might then be dismissed to his home, and only called out for a month's training once in every two or

three years, with the liability however of continual embodied service in the event of war or any other emergency. A Coorg enlisting on these terms should be paid only during training, and when embodied. If called away on active service his family should be supported by the State. At the end of a certain period, say twenty years, a bonus, a grant of land, (of which there is plenty to spare in Coorg,) or some small pension might be given him. His arms, uniform, and necessaries should be supplied by the State, and kept in store at Mercara. On these terms the Coorgs, we feel sure, would enlist in large numbers, as in them the military instinct is inherent, and this instinct they could gratify without sacrificing their connection with home and country. The population of Coorg is about 120,000, but of this number only about 30,000 are true Coorgs. Of these let us suppose some 2000 men would in course of time enlist, such a number would, on the embodiment of the whole, give a disposable force equal to providing two service battalions and a dépôt.

Now it would be quite unnecessary to call out the whole of this force every year, owing to the thorough preliminary training which every man would have received, and by only calling out for training each year sufficient men to form one battalion, a considerable saving would be effected, whilst at the same time the training could be more effectively conducted. Besides the officers, drill instructors, etc., it would be necessary to maintain permanently at head quarters a few men for guard and fatigue duties, these few men could probably be drawn by volunteering from the force itself if a fair remuneration were offered; if not, a company of Madras Sepoys would still have to be stationed at Mercara to perform such duties, but the rest of the regiment should be withdrawn, as it is avowedly stationed there not for maintaining tranquillity in Coorg, but for overawing the contiguous populations of Malabar and Mysore, an object which would be better attained by a strong and trustworthy Militia than by an attenuated battalion of Madras Infantry.

We have now to consider how such a corps should be officered; and in considering this, we must not forget that the circumstances of the corps would be so utterly different from those of other native regiments, that we have little or nothing to guide us.

We must remember that for six months in each year there would be about a hundred recruits undergoing their preliminary training, (the first year or two the numbers would of course be much greater), that for the last month or six weeks of that time there would be (the first two years excepted), a whole battalion of trained Militiamen out for drill, and that for the rest of the year there would only be at head quarters the permanent staff and as many men as would be absolutely requisite for guard duties, &c. We must also bear in mind that in Coorg a remnant, as it were, of the feudal system still exists and that consequently the native Coorg gentry are held in great respect by their inferiors. These native gentlemen would be admirably suited to fill

the lower commissioned grades, they would have the greatest possible influence over the men, and would never excite that contempt which the sepoy so often has for his low caste native officers. Promotion from the ranks should be very exceptional, and only given as a reward for distinguished services in the field, for the Coorg is not as a rule remarkable for intelligence, and is in character so independent that it would be hard for any one not his social superior to exact obedience from him. This characteristic makes it absolutely essential for the sake of discipline that the officers should be of a superior class. Of this superior class we could easily obtain as many as were wanted. There are the European planters and the native Coorg gentry ; some of the planters are ex-officers and many others would, from their knowledge of the country and people, be well fitted to hold Militia commissions as Lieutenants or Captains. The Coorg gentlemen, though mostly well off, are always anxious for Government employ, not for the sake of the miserable stipends attaching to the offices they hold, but simply for the status conferred by official positions, and we may truly say that there is no employment they would appreciate more than the military, especially as that service would only exact from them the sacrifice of a month or two in the year. But although these men would be brave leaders on service, and would always maintain discipline in their companies, they would never, from the limited nature of their service, be sufficiently instructed themselves to impart instruction to others, nor to assume any higher command than that of a company.

This result leads us to the conclusion that, besides the company officers drawn from the province, we should require a small staff of European officers from the regular army, to attend to and supervise the instruction of recruits during their preliminary training, to assist in the annual training, and in case of mobilization to assume the higher commands such as battalions, wings and detachments. Of what should this Staff consist ? As that depends entirely on the strength of the force, we must first estimate what that strength would be. We have already stated that probably about 2000 men could be raised, in other words enough for two battalions and a depot. The staff required for each battalion would be, one commandant, two wing officers and an adjutant. For the depot one commandant, and for the control of the whole force one field officer and one staff officer. That is, eleven regular officers in all would be required on mobilization for service. We therefore propose that the permanent staff of regular officers with the force should be—

One Commandant (a field officer).

Two Captains.

Six Subalterns.

One Adjutant.

One Quartermaster (a captain)

On mobilization, the commandant and adjutant would form the brigade staff, the quarter master would take charge of the depot, the

two captains assume command of battalions, and the subalterns supply the wing officers and adjutants for those battalions. The battalions should as much as possible be organized on a local system, the country being divided into districts, each district having its own company and its own company officers ; such a system would lead to a wholesome spirit of rivalry and might conduce to "esprit de corps." During training it would be impossible to adhere to this local system, as only one-third or a half at most of the force would be out for training in any one year, each district furnishing but a small quota ; it would therefore for training purposes be necessary to form during training a provisional battalion of the whole, which might be divided into two wings each of three companies, each wing being commanded by a captain of the permanent staff and each company by a subaltern. The staff enumerated above would in this manner fulfil the conditions imposed both in peace and in war. It would supply all but the company officers on mobilization, and it would be sufficient to thoroughly supervise both the preliminary and annual training.

We now come to the question of non-commissioned officers. These should undoubtedly be drawn from the ranks of the corps itself, but at first at all events it would be necessary to obtain drill instructors from other sources ; in fact we believe a permanent staff of such instructors would always be necessary for the training of the recruits. For this purpose we might employ either European or sepoys ; although the former might be the better instructors, we think on the whole it would be advisable to take the latter. European sergeants would be inclined to arrogate power to themselves, and would fail to understand their subordinate position with reference to the native officers ; besides which they would be more expensive, and less easily spared from their regiments. A permanent European quarter-master sergeant and orderly-room-clerk might be necessary, but no one else.

As regards dress nothing could be more suitable than the national costume, it looks well, is comfortable, and admits of the free action of the limbs. Moreover it is peculiar to Coorg. For full dress each man might be provided with a long scarlet cloth tunic of the Coorg pattern with black cummerbund and turban, or vice versa, and a pair of sandals. No trousers would be necessary, as the Coorg coat reaches below the knees. For undress two or three long tunics of white drill or brown-holland, with coloured cummerbund and kerchief (a kerchief is the national head dress). The full dress clothing might be kept in store at head quarters, the undress left in the sepoy's possession, with the obligation of keeping it up.

The arms and accoutrements might consist of, a Coorg knife, a snider rifle and bayonet, a belt, ball-bag, and pouch of tanned leather, (a Militiaman has not the time to study pipeclay, and moreover Coorg has a damp climate,) a havresack, a water bottle and finally a blanket, which on the march could be worn "en banderole." These equipments as well as the ammunition would

be kept in store at Mercara, and only issued for all during training or mobilization.

So far we have touched upon all the principal points in connection with the organization of a local Militia corps, on the desirability of having such a force, and the objections thereto, on the facilities for raising it, on the means of training and officering it, and on the dress and equipments most suitable to it. Let us now compare the relative value of such a force and a regular sepoy regiment.

A Militia so constituted would, we believe, give us more than twice the number of men, at less than half the cost of a sepoy battalion; it would give us a strong force on which we could always rely in the event of internal disturbances in the Madras Presidency or Mysore, where as in such circumstances a sepoy regiment could not be implicitly trusted, and it would give us a force which could be rapidly and easily placed in the field, and thoroughly suited to the work required of it. To day if a Moplah outbreak were to occur, the regiment at Mercara might possibly send four hundred men down into Malabar, but these four hundred men would take some time to get there from Mercara, and would soon be knocked out of time by the harassing desultory sort of work they might have to go through. Whereas under a Militia system on the news of an outbreak, orders might be promptly sent to the districts nearest the scene of rebellion, or even to every district should circumstances require it, and the men according to pre-arranged instructions, would at once assemble under their own officers at certain given points, merely bringing with them the undress clothing in their possession; meanwhile their arms and accoutrements could be rapidly forwarded to them from head-quarters, and officers of the permanent establishment would arrive to assume command of the force destined for operations in the field. In this way any given force under the full strength of the corps, might be moved on the shortest notice to the scene of action, where we contend they would be of far more practical value than Madras sepoys shackled by red-tape, dependent on Commissariat arrangements, and inured only to brigade parades.

There is yet another point in connection with Coorg, that we would draw attention to, and that is the feasibility of raising a small corps of gunners, on a similar footing, from amongst the European planters. This corps or troop might consist of a couple of mountain guns, with a small number of mules, and about 30 men, under the command of an officer of Artillery, with one or two non-commissioned officers attached for duty. This little corps should of course be affiliated to the Coorg Militia, and be under the orders of its commandant; such a troop would without doubt be a most useful auxiliary to the Infantry in cases of street fighting, attack of houses, stockades, etc., it would increase the efficiency of the whole out of all proportion to its extra cost, and could render the force independent of all extraneous aid. The planters could easily put in their training, as in April and May there is no work to be done on the estates and most of the planters at that season take a holiday either to Mercara or the Coast.

We have done. We have sketched the outline of a scheme for utilizing at a moderate cost, a valuable material for military purposes, a scheme too which we believe will do much towards elevating the nature and fostering the loyalty of this mountain race. We have left out many important details, merely endeavouring to give a general idea of what might be done. The subject of enlisting Coorgs has often been discussed before by officials and people interested in or locally connected with the country, but it has never attracted the attention of the general public, and consequently nothing has ever been done. If we really wish to strengthen our position in the country, and consolidate our rule, if our object is to be prepared for any and every eventuality, let us leave no stone unturned that may suit our purpose, and let us hasten to put our house in order. In a word let us act, not talk ! Then may we smile at our enemies in the gate.

E. G. B.

"About a year ago I contributed an article on this subject to one of the local papers of Southern India, but a Southern Indian journal has not that extended circulation likely to give publicity to its contents, nor prestige sufficient to influence the views of its readers. I have therefore ventured to rewrite the article in question, convinced of the importance of the subject, and hoping to ventilate it more thoroughly through the instrumentality of the United Service Institution of India.

II.

**MILITARY RECONNOISSANCE IN CONNECTION WITH
OUT-LINE SKETCHING AND RANGE FINDING.**

BY LIEUTENANT COLONEL AND BREVET COLONEL A. W. DRAYSON, R. A.,
F. R. A. S.

Military reconnoissance is a subject to which considerable attention has been deservedly given in modern times.

The necessity for studying maps in order to understand the nature of the ground over which military operations are carried on, is recognized by all competent officers. Thus a Military reconnoissance complete in all its details is an essential in Modern Warfare.

A Military plan or sketch differs from what may be termed a civil map in one or two particulars. Whilst it is essential that a civil map should be minutely accurate in all its details, little attention is given to the military features, viz., to the various slopes of ground, the nature of the buildings, and the soil of the country under varying conditions of climate. Thus a military map need not be minutely accurate as regards the relative position of objects, but it should be exact in regard to those military features which are likely to affect the movements of an Army or of Troops.

Although Civil Maps may often be procurable in a country yet these do not usually supply the information which it is necessary a General should possess before commencing operations. So that a trained staff of reconnoiterers is an essential to a Modern Army. Those who are unacquainted with military reconnoissance often ask what are the various items to be noticed in a country and recorded on a sketch. The reply to this question is to ask the Engineer what he would like to know provided he had command of a body of men and was about to travel in a strange country. Naturally the following information would be desired.

The nature of the roads, whether they had steep slopes, whether they ran between banks and were narrow or otherwise, what effect rains had on them, what bridges were to be crossed, whether these were commanded by surrounding heights.

The amount of water procurable, also of wood for fuel. The quantity of food likely to be obtained, either as grain or in the form of cattle, sheep, goats, &c. The slopes of ground should also be carefully measured and care taken to ascertain whether the nature of the soil is such as to render these slopes more or less easy of access than the mere angle of inclination would itself indicate. A loose gravelly soil mostly makes a slope of 15 deg. more difficult for Infantry, than 20 deg. would be if the soil were hard and covered with long vegetation.

The great object that an officer employed as a reconnoiterer should have in view is, that his sketch should be clear, easily read, and should afford all the information that he can procure and that is likely to be of service to a stranger in the country. The written information should be concise, and the greatest care should be taken that what is stated from personal observation should be strictly correct. Information obtained from natives or from other sources should be given as from hearsay, the Officer receiving such report being able to judge of the accuracy or otherwise of the reports he gives.

A plate of conventional signs should be in each Officer's possession and these signs should be made use of where required, and the sketch as little as possible defaced by writing. For example a church is represented by a cross on the sketch. It is therefore unnecessary to write "Church" but some information as to the thickness of the walls or the height of the building may be given in writing, which could not be shown by "signs" on a sketch.

A reconnoissance may consist of merely a road intended for the line of march of Troops or of a tract of country.

When a road is to be reconnoitered the officer making the reconnoissance should sketch or at least examine not less than three or four hundred yards on each side of the road and if the country be open all important objects should be shown which were within 1000 yards.

The nature of the soil of which the road consists, and the greatest slopes, as also the points on the road most likely to be defended by an enemy, are the principal items to which attention should be directed.

When a certain portion of country is to be sketched the work of the reconnoiterer is very much facilitated if a few well defined points can be given on various parts of the ground and plan. By aid of these and by interpolation when the compass or sextant are used, any person can fix the positions of almost all the important features, buildings, &c. Except for minute details pacing is then rarely necessary. An Officer may be mounted and may gallop from point to point and complete a sketch of ground which is not practicable with such rapidity by any other means. The method of plodding along a road, taking bearings and pacing is a slow and tedious process compared to the rapid and equally as accurate a method of determining positions, by interpolation when five or six important points have had their positions determined.

When no maps or other means are available for fixing the position of important points in a sketch, a base line should be paced in a convenient place and angles or bearings taken from the extremities to all the objects that appear likely to be useful.

Each of these objects should have its position checked by the intersection of three lines and when the positions of such objects have been defined, they should be distinctly marked on the sketch, whilst

all lines used for plotting bearings or angles, should be rubbed out. It is a common error of inexperienced sketchers to cover their sketches with a number of lines representing angles or bearings, and thus producing a confused net work of pencil marks, which soon puzzles them and causes their sketch to be unreadable.

A sketch should always be kept in such a state during its progress that it might be continued by a second person and understood by him as far as it has gone, supposing circumstances interfered with the original operator continuing his work.

REPRESENTATION OF SLOPES OF GROUND.

Much attention has been given lately to the manner in which hills, and the slopes of ground should be represented on paper. "A scale of shade" as it is termed has been adopted and is now generally used in England to represent the slopes of ground.

The great object to be gained in representing slopes of ground is that all slopes of equal steepness should be indicated by exactly the same means by all draughts-men. Before a scale of shade was introduced it was the practise for each sketcher to use his fancy or his taste as regards the depth of shade used to show different slopes; when these various sketches were joined so as to form a plan of contiguous ground these could not be "read" in a military sense on account of the want of uniformity in the manner of showing the hills.

The best, quickest, and most clear method of representing the slopes of ground is by contours. These if drawn with tolerable care and fair accuracy will not only show the form of ground, but will give the angle of inclination of the various slopes. When time admits of it, a wash of sepia, neutral tint, or Indian Ink may be run over the slopes so that they at once attract the eye, and when an elaborate sketch is required the intervals between the contours may be filled in with Lachures using the scale of shade as a guide.

It is most desirable that the hills should be clearly shown in a sketch, but care should be taken that these hills are not so shown as to render other and important details scarcely discernable. This error is not unusually committed by those who pay too much attention to hatching, who are good artists, and who sometimes lose sight of the object of a military sketch in their endeavour to produce a pretty picture.

The angle of inclination of the slopes can be readily obtained with a protractor and plumb line, the line being attached to the centre of the protractor on the edge opposite to that on which the degrees are marked. The divergence of the string from 90 deg. in protractor gives the slope when the protractor is held parallel to the ground.

OUTLINE SKETCHING.

An outline sketch of the distant country, seen from important positions in a wood, is often of great use, more especially when the ranges of all noticeable objects are given in the sketch.

There is a general but mistaken belief that an outline sketch requires considerable skill on the part of the draughtsman who attempts it. To make an outline sketch that will be of great use in a military point of view requires but moderate care, for it can be converted into a mere mechanical process.

The most simple method of making an out-line sketch is to select some remarkable and easily recognised object near the horizon to measure 60 deg. along the horizon either right or left as may be required. Divide this space into 6 parts, each part then represents 10 deg. Measure the angular distance of the various prominent objects from the right or left of the first object and these can be placed on the sketch in their relative position by scale; no margin is thus left for errors of judgment in regard to the distances of the various objects from each other. Care should be taken to carefully draw and define such objects as can be readily recognized, such as buildings of peculiar form, rocks, or clumps of trees. Especial attention should be given to all such localities as an enemy would be likely to occupy in the event of an attack. The ranges of all these being obtained and given in figures on the sketch, will be of great service in case Artillery are required, and if the sketch be taken from a Fort or any place likely to be entrenched, short ranges should be obtained as a guide for Infantry Rifle men.

RANGE FINDING.

Since the introduction of more accurate weapons into the army, it has been found of great importance to know the exact range of the objects fired at. This has led to many attempts to produce instruments and invent systems for finding ranges, which have met with only partial success, a result due in a great measure to the following reasons.—

It is considered desirable to possess an instrument which should be so simple that the most illiterate stupid man could understand it and could not make a mistake in using it. Also that the instrument itself should be so strong and rigid as to stand the roughest usage without suffering any damage. Also that the instrument should give perfectly accurate results, and should be capable of being used in every form of ground, and under every condition. Such an instrument is an impossibility.

What is really required is an instrument that is extremely portable, that is not likely to be damaged by rough usage, that will give fairly accurate results, and that can be used under nearly all the circumstances likely to occur on service.

Of all the instruments that I have seen employed for range finding I give the preference to the common pocket sextant, which is simple in its application, not easily damaged, readily adjusted if it be in error, very portable, and fairly accurate.

A pocket sextant may be made use of to find ranges either by taking a long base, say 100 yards and measuring angles from either end, and by calculation or construction finding the distances, or when rapidity is necessary a right angle may be set of with the sextant, the second angle at the base measured with the sextant, and by means of a scale of tangents, the range may be at once ascertained. With a trained observer to secure the right angle, I have found that the ranges can be found on average ground in less than a minute by this method and with an error not likely to be more than one-half or two per cent.

The extreme portability of the sextant, its freedom from warping owing to changes of weather or temperature, and its accuracy induce me to recommend and select this instrument in preference to any other.

A week's training I have found sufficient to teach men of average intelligence how to find ranges by this method.

TIME OCCUPIED IN SKETCHING.

Every officer likely to be employed in making a sketch should be well acquainted with the rate at which he can proceed, and the amount of accuracy resulting from various rates of progress.

If a sketch of ten miles of road is required in four hours, it follows that accuracy must be sacrificed to time, and each officer should be able to judge of the amount of attention he can devote to details in order to produce the best results in the given time. When two or three officers are available, a considerable saving of time may of course be effected and accuracy obtained, but what may be considered a fair hour's work should be a point which each officer must judge of according to his skill and proficiency.

As a good reconnoissance and report call for the greatest judgment and expertness on the part of those who executed them, each officer should be informed of the object for which his sketch is required, his attention and observation will then be focussed on those particular items, whilst matters which might for other occasions be of importance will not occupy his time.

SKETCHING WITHOUT INSTRUMENTS.

To make a fairly accurate sketch without instruments is a most useful accomplishment and is one by no means difficult of acquirement. Pacing can be employed for obtaining distances whilst the angles can be closely approximated to by means of a pencil or protractor held at arm's length, and moved its own length as many times as is required to measure between two distant objects. Suppose these two objects are found four

and a half protractors distance apart. It is then only necessary to ascertain how many degrees the protractor subtends at arm's length to find the angular distance of four and a half protractors. In order to discover the number of degrees subtended by a protractor or pencil when held at arm's length, some point on the horizon should be selected and the protractor moved its own length from this object as many times as it is necessary to do so to measure all round the horizon, then 360 deg. divided by the number of times the protractor has been moved will give the number of degrees subtended by it. For an average length of arm, a six inch protractor will give about 10 degrees to 11 degrees.

The importance of the subject of reconnoissance, range finding and reading of maps, is so great that too much attention cannot be given to every branch of what is usually termed military sketching, and it may be fairly demanded, especial'y in India where there is so much spare time for almost every person that, each officer should be able to make a military sketch, writing a reconnoissance report and reading rapidly the military features of a map.

III.

MAPS.

REPRINTED FROM THE ENGLISHMAN.

SOME Sciences in particular present themselves in the simplest form and most clearly expressed results, without revealing in any way the profound knowledge required for their development. Of these geography is one. The latest maps of the most recent discoveries are within the reach of every one. By them the traveller can plan his journey, the general his campaign, and the engineer lay out his projects. Ordinarily educated people study them to refresh their memory, or to keep themselves up to the level of the knowledge of the day ; for geography is ever one of the most familiar and attractive of studies. Nevertheless, there is amongst most people a great deal of ignorance regarding the initiatory measures for the preparation of a map, and how or why the information it furnishes can be trusted. There is, it is true, a vague consciousness that a map represents a great deal of accurate work of the most precise and delicate nature, which must be completed before that intricate delineation of the features of the earth can be shown in sea and land, mountain, valley, and stream, as they appear on that paper. Unless this preparatory work is partly understood, the beautiful accuracy of the map before us cannot be properly appreciated. Moreover, maps speak in a language of their own, and it is necessary to be able to read the meaning of the numerous conventional signs whereby the topographer speaks to the student of geography. A little understanding of the subject of scientific geography renders the subject far more attractive when it is known that the maps we obtain information from are based on astronomical observations of the most minute character, and the highest precision in calculating their results of which the human power is capable.

Maps on a small scale first appeared in the beginning of the 18th century, and in these the delineation was shown with the effect of isometrical perspective. The earliest map extant of France, drawn by Cassini, shows towers thus drawn to denote the position of towns and villages ; the hills as conical heaps, strongly marked with light and shade. Under the pressure of necessity to supply the new wants of civilisation in works of utility, such as roads, canals, and fortifications, it was found that a more faithful representation of the surface of the ground was required, and greater accuracy in the determination of the position of places. The engineer required exacter limits of hill and valley, and the rise and fall of undulating ground. All these necessary refinements and improvements in the maps are the result of the work of the scientific geodesists, who first established the base on which the maps should be projected. These labours first bore fruit in France, and, in describing the earliest steps of those who established geography as one of the exact sciences, we shall follow the proceedings of those distinguished Frenchmen, whose labours culminated in the Base me-

trique, and the materials whereby the solution of that most interesting of problems, the true form of the earth, was first established as it is now accepted by the world of science. We know that Homer, who was, probably, as well informed as any of his contemporaries, thought that the earth was a round disc, bounded by the sea, the whole supported by a colonnade, which Atlas looked after. Herodotus had no better idea of the universe than of its being an immense plain. Gradually, a sounder view was taken by men who carefully observed the stars. It was remarked that one star remained stationary as a pivot to the stellar host; and men noticed that this particular star rose as the observer advanced towards the north, and dipped towards the horizon when viewed from more southerly points. This change with reference to the horizon was irreconcilable with the accepted notion that the earth was a plane, as it was evidently globular. Then the next point established was that the sun rose earlier eastwards, and this confirmed the impression that the earth was rotund. In Aristotle's time it was thoroughly well known that our earth was an immense globe, poised in space. To this period we can trace back the division of the terrestrial surface into meridional lines passing through each pole, and others at right angles to them and parallel to the equator. Because the earliest inhabitants spread themselves along the temperate climate bordering on the Mediterranean and eastwards, through Asia Minor towards Persia, and because little was known of the cold, bleak lands to the north, or the torrid burning deserts to the south, the world was erroneously supposed to be longest from east to west; so the first divisions were called lines of longitude, and the second lines of latitude. The circumference was divided into 360 of each, and establish what are called geographical co-ordinates, which show the position of any spot on the earth when its longitude and latitude can be declared.

One of the first subjects which naturally occupied the attention of the earliest astronomers, was to obtain the dimensions of the globe they inhabited. The first recorded attempt was made by Eratosthenes, who had remarked that, in the summer solstice no shadow was cast at mid-day in Syena, and concluded from this fact that that town was situated within the tropics. On measuring the length of shadow cast at the same period in Alexandria, he calculated that Alexandria was about seven and a quarter degrees north of Syena. On the supposition that both places were in the same meridian, and assuming a certain distance between the two towns, he deduced that the circumference of the earth amounted to about 250,000 stadii. Some of his contemporaries obtained results more or less approximate, by equally rough methods. We are the more unable to appreciate these results, and test their approach to truth, inasmuch as we are unacquainted with the linear value of the stadium, which was the unit of measure employed by the Greeks.

Evidently, the astronomical observations on which all geodesical measurements are based could make little progress until telescopes

should be invented. In operations of this nature, it is essential to measure certain angles with extreme nicety, less for the purpose of magnifying the object than for the purpose of obtaining perfect clearness in the direction of the visual ray. With rough instruments, mounted only with back and foresights to direct the eye, Tycho Brahe obtained angles that were correct within a minute; but less skilful observers were very far from attaining his accuracy. In our modern works angles are measured within a minute fraction of a second, and accuracy of this nature is absolutely necessary for all the higher class of astronomical work.

The Telescope was invented in 1549, but not applied to astronomy till 1609, and the measurement of the earth was then resumed with more success. Before mentioning the numerous attempts made in different countries to realise this measure, it is important to give a simple explanation of the method adopted to secure it. Two points of reference, sufficiently distant from each other, are chosen. The latitude and longitude of both places are determined with the greatest possible accuracy, and the distance apart between the two places is thus known in degrees, minutes, and seconds of space. If this distance was absolutely measured over the surface of the earth, with any linear standard, the number of metres, or yards, in each degree would be ascertained, and from this the totality of the circumference of the earth might be computed. But such a task as measuring this great distance would be tedious and difficult beyond conception, for the points selected are probably four or five hundred miles apart. It is, therefore sufficient to measure a base line of thirty or forty thousand feet in length at each extremity of the arc of the meridian about to be measured. From one base originate a series of triangles which extend in a continuous chain until they reach the other limit of the arc, where the distance obtained from the last computed side is brought down and tested on the measured base of verification. With slight modifications, the result of experience, a meridional arc is thus determined at present, as it was by the astronomers of the 17th century.

The first operation of this nature was commenced in 1669 by Picard, who selected Sourdon, in Picardy, and Malvoisine, in the department of Gatinais, as the extremities of the arc. His result was to establish the length of a terrestrial degree to be 57,060 toises, equal to 121,648.75 English yards. This work, which was first accepted as rigorously correct, became subject to doubt when it was suspected that the earth was not an exact sphere. A clock that had been regulated at Paris according to the mean motion of the sun in that latitude, having been carried to Cayenne by the astronomer "Richer," he ascertained that in the lower latitude the clock lost two and a half minutes each day, and discovered that, to keep time at Cayenne, the Pendulum should be shorter than at Paris. He argued from this that the earth was flattened towards the pole. This hypothesis was favourably accepted by mathematicians as a natural consequence of the rotatory motion

of our planet to the semi-fluid surface. Huygens proved the idea to be correct, and Newton confirmed it by astronomical observation.

It is greatly to be regretted that a universal standard of measure has not been adopted by all civilised nations interested in common mathematical science. The French metre of 39.37079 inches is the ten-millionth part of the whole distance from the equator to the pole. The English pendulum is 39.1393 inches. If the equatorial pendulum of 39.015 inches had been adopted as a standard of measure for all nations it would have been advantageous. The French is, undoubtedly, the most natural standard, because pendulums vary owing to the shortening of the sines of the spheroid.

Our English yards and barleycorns are vague and merely conventional.

The doubt established regarding the shape of the earth complicated matters considerably, and weakened belief in the measurement based on Picard's work. From the moment it was accepted that the form of the earth was spheroidal, rather than spherical, it was also evident that all degrees on the surface were not of the same length, and that they lengthened as they approached the poles. To measure only one degree on the surface of the soil of France was manifestly insufficient. Another measurement must be made at the equator, and a third far north in Lapland, as nearly as possible to the polar regions. By a common comparison of the results, it was hoped that the true curve of a terrestrial meridian could be determined. A double object was to be attained: if the shape was, as supposed, elliptical, the major axis, or the diameter at the equator, and the minor axis, the diameter at the poles, would be satisfactorily established.

These questions were of absorbing interest to the learned men of the eighteenth century, and most especially amongst those of France. To France belongs the honor of all the first advances and discoveries in geodesical science, and it is but just to admit that, up to the present day, the observers in other countries have adopted the system and proceedings she inaugurated.

In 1736, the French Academy of Science equipped three parties to prosecute the necessary researches. "Maupertuis" went to Lapland; "Bouguer" and "La Condamine" were sent to Peru; and Cassini prolonged Picard's triangulation throughout the whole limit of France, from north to south. At about the same period Lacaille measured a degree at the Cape of Good Hope.

Maupertuis and Lacaille committed the same mistake in not extending their operations to a sufficient length, and their results did not agree with those in Peru, which were admitted to be rigorously correct, or with the measurements obtained in France. This want of accord left doubt in the settlement of that delicate question; so that, in 1792, when the national convention wished to create the system of decimal

measurements, based on the length of a metre, or the ten-millionth part of the measurement from the equator to the pole, it was necessary to re-investigate the former contradictory operations. The French arc was remeasured, by Delambre and Mechain, from Dunkirk to Barcelona; and from this work, and the measurements in Peru, the present legal length of the metre has been fixed. We would here remark that the convention aimed at an object which cannot be secured with certainty. If those measurements and calculations on which the metre was established were resumed, it is certain that a difference would be obtained in the figures, although human hands might be unable to show the difference in workmanship. It is incontestable that Puissant discovered a flaw in the calculations, the result of which would be to augment the length of the metre by a quantity slightly in excess of the four-thousandth part of an inch. The astronomer can recognise these minute quantities, although the human eye could not see the difference. Finally, it has been recognised that the length of a degree varies on different lines of meridian, and that the curve of the arc of the meridian which passes through Paris, is longer than that which intersects New York. The invariability of the metre as a unit of test is not its single recommendation for having been so adopted, though the measure in itself possesses so many advantages in other respects, that it is a matter of indifference that it cannot claim total infallibility.

The geodesical operations we have noticed hitherto are of so ancient a date, that they only received brief allusion to their results. As far as the actual question of the curvature of the arc was concerned, those operations doubtless set the matter at rest, and it is improbable that any other nation would have commenced so expensive and laborious an undertaking for the purely scientific solution of the question; but exigencies of national importance induced other nations to follow in the lead France had given. England was the first; then Germany and Russia; more recently Austria and Italy; last of all Spain. But it is not only in Europe that the progress of measurement and topography has advanced. In India, in South Africa, in the United States, Central and South America, Egypt and Turkey, everywhere, in fact, where civilisation has extended itself, and given birth to those material wants, roads, canals, and railways, the construction of which depends on a knowledge of the levels of a country, strict geodesical work has cleared the way; for the great triangulation which forms the framework for topography is precisely the same as the work required to measure the arc of the meridian, and geodesial science will thus ever advance with the growth and spread of civilisation.

It has been recognised that short arcs are not so valuable as long ones; so, when the French arc, which had been carried from Dunkirk to Barcelona, and extended to Formentara and Ivica, by Biot and Arago, was connected with the English triangulation, an arc of twenty-two degrees was obtained. The great Russian arc extends over 25 degrees. In India we have measured 24 degrees, and five degrees at the Cape.

All these pieces of work enable us to take a more general view of the question ; but, to this moment, so many parts of the world are still unknown that we cannot even now declare that there is perfect certainty regarding the universal curvature of the earth's surface.

Of this Colonel Clarke, Royal Engineers, writes that the figure of the earth which would best correspond with the surface of Great Britain would be a spheroid of revolution with an equatorial semiaxis of 20927005 feet, a polar semiaxis of 20852372 feet and an ellipticity of $\frac{1}{290.4}$. By a comparison of the 9 arcs measured in Peru, India, France, However, Denmark, Prussia, Russia and Sweden, he found that the elements would be 20926348 equatorial and 20855233 polar axis. The ellipticity $\frac{1}{294.2}$. Corrections have since been made and the ellipticity now stands $\frac{1}{294.3}$ but it is admitted that this is not final and will be modified again.

For the present, we must rest content with the hypothesis that the earth is an ellipsis, with three unequal axes. There is no doubt whatever with regard to the flattening of the earth at the poles ; but of the shape of the ellipse at the equator, uncertainty is still admitted. Astronomers have at various times satisfied themselves that they were in possession of the necessary elements for the calculation ! but ever and anon new difficulties arose with the improvement of instruments, which enabled more elaborate observations to be secured. Perhaps, the researches, still followed up so pertinaciously in England, Germany, and France, will result in satisfying the last demands of science on the most interesting and complex question which has hitherto eluded the intellect of man, and the learned will agree amongst themselves regarding the absolute shape of the earth at the equator.

Whether the earth is a perfect sphere, as was supposed by the ancients, or presenting elliptical curves on its surface round the axis of the poles, or an ellipsis with three uneven axes, according to the latest theories, it is not the less certain that it is impossible to represent faithfully on a flat sheet of paper any great extent of its surface. The curvature of the surface prevents the possibility of showing on a plane the exact distance between places, and the relative extent of areas in space. Thus, the shape and size of countries are necessarily altered when shown on geographical maps. Geometricians have invented an infinite number of methods to remedy this defect in the projection of maps, all of which have advantages or inconveniences peculiar to each. The framework of the projections of geographical maps is a purely theoretical question, chiefly of interest to mathematicians. It is only essential to select for each portion of the earth the projection which would cause least alteration in shape and size. For a map of the world it is of slight importance if the polar regions are not shown in true proportion provided the equatorial and temperate zones are shown as faithfully as possible. For maps extending over comparatively small extent of surface, a projection suitable for France and England would scarcely be suitable for a map of Russia.

But, whatever projection is adopted, the outline is limited to showing the meridian lines and parallels which divide the surface into the curvilinear quadrilaterals, within which the geographer enters the position of the towns, the mountains, roads and rivers, the variations of the surface, the works of man, and, when the scale admits, the limits of cultivation, woods, meadows, or fields. The space allotted to these details is, of course, in proportion to the scale, but all these items should be entered on large scale maps, and small scale maps which are, of course, only reductions from the larger projection, only retain such details as can be shown without overcrowding. Large scale maps are the highest and truest expressions of the geographical surveyor, and the men accustomed to produce them are always the most careful and vigilant surveyors of the class employed in topographical work.

The large scale survey of France was commenced by the 1st Napoleon, who attached the highest importance to encouraging topography, on account of the assistance its results gave to all military and strategical operations. The object required was to obtain a faithful delineation of the whole of the French soil, in short, a map which should be as complete in all respects as any that a landed proprietor might have of his garden and pleasure grounds, the whole based on rigorously delicate triangulation. To effect this purpose, there was an ample staff in the large body of officers, designated as Topographical Engineers, attached to the Intelligence Department of the army staff. The march of political events interfered with the immediate development of Napoleon's idea, but it was resumed in 1817, when a commission of 14 members, under the presidentship of Laplace, was appointed to investigate the matter, and take measures to assimilate the large scale survey, undertaken for the settlement of rents, for each field, and which was called the geometrical cadastre of the country. This work was not projected on a continuous system referred to a mathematical basis; but it consisted of exact mensuration for everything which appeared on the surface of the soil. The fields are mapped on a scale of 1,000th of the natural size, being more than two-and-a-half times the size of our British ordnance survey, which is on the scale of 25 inches to the mile, or 1 in 2,534. The French field survey is on the largest scale yet undertaken, and has been so complete in all respects of detail, that no special survey has ever been required for railway, road, or canal since the completion of the French cadastre. Commenced in 1818, it was finished in 1865, and the last of the maps appeared in 1872, the first having been published in 1833. Eighty officers were employed on this work for fifty years. It is supposed to have cost about £700,000, on an area of 160,000 square miles. The most important, as well as the most difficult and delicate portion of the work connected with the projection of the map of a country, is the triangulation of the first class on which the position of the most important parts depends. Every refinement of accuracy that can be attained by human means is exhausted to ensure the exactitude of this work. The process is analogous to that demanded for the measurement of an arc of the meridian over an

extended country. This system of first class triangulation would be extended at intervals of about 100 or 120 miles apart, and meridional series are connected with equally rigid longitudinal series, at about the same intervals in distance. By these means, the whole tract of country is covered with great quadrilaterals, within each of which areas varying from 10,000 to 12,000 square miles are enclosed. The sides of such systems of triangulation may vary from twenty to thirty miles in length and are sometimes greatly in excess.

The spaces within the great quadrilaterals are then filled up by what is called secondary triangulation, which is performed with a smaller class of instruments, and without the expensive refinement of detail which is required to ensure the success of the primary work. The sides of the second class triangulation are generally from nine to twelve miles in length. Lastly, this secondary triangulation is again filled up with tertiary work, in which fewer precautions are taken. This triangulation fixes innumerable points, which the topographical surveyors employed to show the features of the country use as points of reference, and check for their subordinate and mechanical work. The dimensions of the tertiary triangulation give sides of three to five miles. Finally, when all the triangulation that we have described is completed, the whole country is covered with many thousands of points, accurately determined by triangulation, and tens of thousands of intersected points, such as towns, solitary trees, chimneys, and gable points of houses; so as to give the plane-table surveyors exact data whereon they can commence, check, and close their work. Each triangulated station having had its latitude and longitude fixed, the graticule of each degree is projected. This is divided into the number of sections required to complete the interior details, of survey. In the Indian surveys, these sections are each 15' in latitude, and 15' in longitude, and sixteen of them complete the degree. In the French, each section is a square myriametre, or the tenth of a decimal degree. On an Indian sheet, 270 square miles are shown, whereas only 38 square miles, English measurement, appear on an equal paper surface in the French map; but, then, of course, the same detail is not aimed at.

As all survey work depends upon the triangulation, so does it depend on the exactness with which the angles are observed, and, as can be readily conceived, human ingenuity has done its utmost to obtain the most perfect mechanical results in the instruments employed for the purpose, which, of course, demand the most delicate precautions that can be adopted to use them, and ensure their stability. Borda's repeating circle was the instrument first used in the operations of the 18th century. This instrument has been succeeded by the theodolite, first invented by Ramsden, an English doctor of medicine. A French instrument-maker, named Gambey, improved greatly on Ramsden's instrument, which had been originally designed of enormous size, and was, consequently, inconveniently heavy.

The causes of error which are committed in observing an angle, are admitted as of several kinds. There is an error in directing on the ob-

ject ; an error in reading ; and there is always a constant error caused by construction in the divisions of the degrees, and the Vernier readings on the horizontal plane of the instrument. As instruments increase in size, with greater focal power in the telescope and minuter readings on the circles, these prime causes of error decrease in intensity ; but it is evident that these very large, and, of course, ponderous, instruments can only be used in the principal triangulation. Smaller circles must be read when the network of the secondary and tertiary is measured ; and a special method of observation is necessary to eliminate the errors we have noticed.

A German astronomer, named Meyer, adopted the plan of repeating the observed angle several times, and dividing the total sum of the angles by the number of the observations. This method was retained for a long time, though it did not really eliminate error to any extent proportionable to the amount of the trouble taken, and only served to reduce accidental error—not the constant error common to peculiarity in the observer, or to error of construction in the instrument. The most practised system of reducing errors in observing is to reiterate the angle from different zeros, if necessary, or ten, twenty, or fifty zeros, and then reversing the instrument to repeat the angles on the opposite face. Thus supposing one set of observations had been from 30, 120, 210, 300, the opposite ones would be 210, 300, 30 and 120 ; and this may be carried out to 100 pairs of readings on opposite faces of the instrument. As it is absolutely impossible to avoid error in all work dependent on human senses, astronomers, who have reduced observation to a system, acknowledge the fact that error must exist in such work, but reduce the result to a minimum by mutually balancing the results of the same observation in opposite directions. A practised observer, who has studied the peculiarities of the instrument under his control, is certain to do all that eye and hand can realise for the success of the most delicate work, aided by the perfection of mechanical power to magnify and measure ; so that the most delicate alterations cannot escape the perfect power he can use. The greatest difficulty the geodesist has to overcome, is not caused by sight, but by the want of stability and infinitesimal tremulous movement communicated by the perturbation caused through the progress of heavy vehicles on the surface of the earth. Of course this cause of trouble to the operations is constant in towns, or in the vicinity of lines of traffic. In the open country, where the instrument is raised on an isolated platform, or in mountainous countries, where solidity for the stations is so easily secured, the work of triangulation is subject to few interruptions.

To estimate the results of first-class triangulation, work, started from a measured base, and carried through 18 or 20 triangles, over a space of 250 or 300 miles, when compared with the next measured base of verification, would, probably, not differ more than one in 70,000 parts. Longitudinal series meeting a meridional series in sides varying from 15 to 20 miles, generally agree to within an inch in computed values. From the result of this work, geographical co-ordinates for every necessary point of towns, villages, conspicuous objects, country-houses, and the

towers of village churches are computed and published in the office of the annuary of longitudinal points. The position of each town, or village, is fixed according to the position of the tower, or steeple, which was taken as the signal-point during the progress of the triangulation. The position of every triangulation station is marked by a large three cornered stone let in flush with the ground, and carefully centred. A record of more than two hundred thousand stations is kept in the Headquarter Office. Nevertheless, in spite of all precautions, through accidents by fire, or the voluntary demolishment of buildings, some of the fixed points are constantly disappearing. The English and Indian triangulation is fully equal to the French work; but, in India, the gaps in the Great Trigonometrical work are, of course, much greater. These gaps are filled up by the operations of the Topographical Survey, or the Revenue Survey, both of which base and check their work on the perfect accuracy of the Trigonometrical. As a matter of course, the vast area of India cannot be so accurately surveyed as regards topography. The only approach made to the large scale survey of European lands is, in the Indian cadastre, on the scale of 16 inches to the mile, which was commenced in the year 1871. Up to this date, about 12,000 square miles have been completed. The large scale work in Madras and Bombay has no scientific basis, and is only mensuration of surfaces; it is not geographical work, and cannot be utilised without distortion of, all its original projection on an entirely new frame-work. No survey work should ever be sanctioned by the Government of India which does not depend upon a trigonometrical basis, unless, as was the case in Assam, the work projected is referred to a particular meridian, and executed with a view to future incorporation. In upper Assam, all the Revenue Survey work is referred to the tower of the church at Debrugarh, and, as this is sure to be taken up by the Great Trigonometrical Survey, the evil we have noticed as the effect of sanctioning preliminary survey operations will not appear. India has bought, by sad and costly experience the knowledge of the errors that exist in survey systems that are not based on a trigonometrical network. More than twenty lakhs of rupees will be spent on a re-survey in Bombay for topographical purposes, of which more than eleven lakhs have been already spent.

Another imperative want is also supplied by the first scientific triangulation. The heights of an innumerable amount of fixed points are obtained to the greatest nicety, the concordance of height of mountain-tops being so astonishingly accurate as to agree amongst themselves to within three and four hundredths of an inch. Equally careful work determines the mean sea level on the coasts, and, from these, series of spirit levelling operations are taken all over the country, which is contoured with the most perfect accuracy, giving every detail of the surface that can possibly be needed by Engineers for the safety of embankments, and the depth of drainage that may be required. Provision for supplying these wants was lost sight of by those who superintended the earliest operations in India; so all the railway projects required fresh preparatory surveys, conducted at a cost far in excess of the original surface

measurements. Considering the experience which had been gained in England and France prior to 1833, it is extraordinary that more far-seeing views of survey requirements were not put forth in India. Colonel Walker's careful levelling operations from the sea base at Karachi to the Great Trigonometrical base at Attock, thence to the Dera base, and on through the Ganges valley, down to the Calcutta base, has been a splendid piece of work, and from his data, Revenue Survey operations in the North-West and Oudh have been connected with a levelling system which is of the highest importance, and has added immensely to the value of the village maps.

We have before said that old maps did not give a true bird's-eye view of the country, but there was a mixture of perspective and pictorial effect, which prevented the true purpose of a map. The representation of the surface form being obtained, the mountainous configuration was entirely lost sight of; the lofty point might be shown, but the mighty shoulders, which were supported by spurs, and these by long gradual slopes which by degrees sank into the plains—in fact, Nature's system, which builds up a mountainous country into one that culminates in the highest point—was not intelligently grasped by the earlier topographers. From such maps it was, of course, impossible to obtain the results wanted by the Engineer, who could not estimate the width of the contained valleys, or calculate the surface of the water basin in the drainage of any particular river.

It is especially the object of modern mappers to render the ground exactly as it appears from a balloon to the eye of an observer. On the large scale maps, everything is drawn in exact proportion. As the maps decrease in size, the less important items are left out, and replaced by conventional signs, which must be understood by those who read the map. Important entries—such as railways, highroads, and canals—receive exaggerated notice, even for the smallest scales. The slopes of the ground are shown by a system of contour lines, each of which may represent a fall of the number of metres, or feet, determined upon. These give the undulations with mathematical precision, and maps furnished with these details are of primary importance to Engineers for the purpose of preparing the first projects and estimates for all works demanding drainage, or embankments—such as canals, railways, and roads.

The French maps show hilly ground by horizontal lines. Where the slope is too steep to permit any interval to be shown, cross-notching is used; and the mixture, though confusing to the eye, has a good effect. The maps of Switzerland and the mountainous tracts of North Italy are lighted from the North-West corner, which is very effective, but is not suitable for moderate slopes.

It is to be regretted that, at a conference of geographers, a system of spelling the names of towns and rivers on the small scale maps should not have been agreed upon, and adopted in the geographical books taught at schools. The want of agreement in the scales used is also to be regretted. The smallest French topographical map is 1 in 80,000.

Our English topographical reduction is 1 in 63,360. But the French have 3 sets of topographical maps of the whole country; one of 1 in 20,000, which is a little more than 3 inches to the mile, and is a magnificent map, abounding in detail, and showing the boundaries of properties; another of 1 in 40,000; and, besides the maps of the country, a magnificent series of maps of towns on a scale of 1 in 2,000, or 1 in 2,500, which may be expressed a little under thirty-two inches to the mile, and a little more than 25 inches. As all other nations have adopted the decimal scale, it is a pity that in England we have retained our system of dividing distances, based on no known unit. I believe our yard represents the length of the arm of one of our Henries. The French unit is referred to the diameter of the earth.

In the English Ordnance Survey, the large scale map is drawn in the field. The basis of the work is, of course, a triangulation, as described for the operations in France: but, whereas all the reduced measurements for the French survey were done on the plane table in the field, the last details of the English ordnance work are done with chain and compass, and plotted from a field book on to the large scale survey, on the scale of twenty-five inches to the mile, and then drawn at once on transfer paper with lithographic ink. The contours are given at 50-100 200-300 and so on up to 1,000 feet above the Liverpool datum. Stamps are used for all the topographic items for which conventional signs have been admitted. The sheet thus prepared is transferred on to a zinc plate, and as many proofs as are wanted are struck off. These are available for land proprietors, and are sold at very low rates.

These 25-inch maps are reduced to a scale of 6 inches to the mile by photography, and transferred from a zinc, to a copper plate, on which it is engraved. These contours are inserted by field workmen on the ground itself; on the 6 inch prints. From the maps on the scale of 6 inches to the mile, another reduction is made to the scale of one inch to the mile. The reproduction of the copper plates by an electrotypes process furnishes a constant supply of the original work, without recourse to the expensive process of engraving the plate *de novo*, when the original ceases, to yield good impressions. The economy of the process is very great. It is impossible to devise a much better system than that obtaining in the English Ordnance Survey office, which has been able to profit by all the experience gained in France which was about twenty years ahead in its survey proceedings. Owing to the invention of chromo-lithography, maps are beautifully reproduced by manual agency; but, as the drawing on the stone must be a copy of the original, it can never be quite as true as the map obtained through the agency of the camera lens.

As a matter of course, the reproduction of maps in India is chiefly done by photography, and for the cadastral maps in Behar an original copy is made on transfer paper, drawn with Aluey's ink. As far as can possibly be, the experience gained at Southampton has been followed in Calcutta, but the detailed measurements for the maps are not made by the triangulators; they are left to an agency which is called the Revenue Survey. As the latter has not got the numerous points, fixed by trian-

gulation, which are prepared for the detail measurement in England its work covers the country with a vast number of small traverse polygons, closed with some pretension to refinement. The whole of it generally originates from, and closes on, a station of the Great Trigonometrical Survey.

The greatest subject of interest now as regards Indian geodesical work is the possibility of connecting it with the Russian series in Turkestan. This has been talked of for many years, but political difficulties still prevent the completion of the task. If ever it should be completed, and a perfect system of triangulation carried over those mountainous tracts, a comparison of the lengths of a degree where the earth's surface may possibly be affected by the superabounding weight, and degrees measured over plains, may solve questions still mooted regarding the effect of the attraction of mountains. It is recognised that anomalies in measurement, hitherto unaccounted for, may be caused by excess of weight on particular tracts, and diminution of weight, owing to the suspected presence of vast hollows in the crust of the earth.

Germany and Austria have also occupied themselves in the preparation of maps based on a network of triangulation. Prussia has adopted the scale of 1 in 80,000 for her western provinces, and of 1 in 100,000 for the rest of her territory. Austria has, unfortunately, taken up a very small scale; her largest topography is on the scale of 1 in 144,000. The minor States of Baden, Saxony, and Wurtemberg have made theirs on the scale of 1 in 25,000; Holland and Belgium 1 in 80,000. In Holland, as might be expected in a country so liable to overwhelming accident from flood, most special care has been devoted to the refinement of the levels, which has resulted in prodigious addition to the strength of some of the embankments that form her bulwark against the sea. As may be expected, Spain is behind the rest of all European countries in the knowledge of its surface, and, in 1868, was only beginning to push forward its triangulation. Since then, the work has been interrupted by the civil wars which have desolated that unhappy country. We have omitted Italy, which has adopted two scales for its national maps, Sardinia and Lombardy being shown on a scale of 1 in 50,000, while the Southern States are mapped on a scale of 1 in 84,000. That portion of united Italy which was formerly under the Government of Naples is now being surveyed. In spite of its enormous area, Russia has made immense efforts in behalf of geodesy and topography. She has measured the longest known meridional arc, and has made great progress in a national survey, which is mapped on a scale of 1 in 80,000.

This brings us to the notice of Colonel Walker's compilation of the countries between India and Russia, which may be described as a map of Central Asia, based on the latest British and Asiatic sources, as well as of all the latest Russian maps that had been placed at his disposal. The results of the explorations of the pandits sent forth by Colonel Walker and Colonel Montgomerie, between 1865 and 1870, the route survey of the Seistan boundary surveyed in 1872, the Persian exploration

of the same year, and all the Russian work done between 1868 and 1872 enabled Colonel Walker in 1873 to publish a map which is invaluable as a combined view of the soundest results obtained up to date. The following words of Colonel Walker deserve to be recorded:—"Geographical Science, when it is not advanced by sound and systematic surveys, but is dependent on information acquired from the itineraries of travellers, and from crossquestioning the inhabitants of a *terra incognita* has to make its way by zigzags of approach, often overshooting the mark to which it is directed, sometimes, perhaps going wrong altogether, but, yet, always endeavouring to reach its goal by successive approximations. This is pre-eminently the case as regards the geography of the portions of Central Asia which respectively lie beyond the boundaries of the Russian and British territories, and more so as regards the former than the latter; for accurate and continuous surveys on a trigonometrical basis have now been carried up to the British frontier throughout its entire length, whereas, on their side, the Russians have not yet had time to execute such surveys. It is evident, therefore, that, until all such data have been superseded by the results of a rigorous and systematic survey, Central Asian geography can only be considered as a preliminary approximation, which is liable to be largely corrected in future."

Mapping is essentially the work of a Government, and in civilised countries this has been absolutely acknowledged. Learned societies, maintained by private subscriptions, have always been willing to aid with their funds the efforts of those distinguished pioneers of civilisation who volunteer to explore the interior of Africa, Australia, and the unknown tracts of the earth. It is to such encouragement that we owe the efforts of Burton, Speke, Grant, Livingstone, and Cameron. To appreciate what we have received from them, to add to our geographical knowledge, compare the last map of Africa with one published in 1850. Though our efforts in this direction have commenced with the travels of Parke and Bruce within this century, our knowledge of the east coast, as far inland as Abyssinia, is equal to our information concerning North Africa, except as regards Egypt and Algeria.

An account of mapping would be incomplete without a short notice of the labours of those men who, as hydrographists, have compiled that vast system of charts which show the navigating courses over the oceans and seas, as well as the vicinity of every coast and the approach to every harbour. For coast surveys of unknown lands, a close approximation to accuracy is made of prominent points and headlands, the mouths of rivers and of all objects which might attract the notice of a navigator. At sea the mariner is satisfied with observations which fix his position approximately, because an error of a few miles in latitude, or longitude, is of little importance where there are no soundings to trouble him.

Small scale sea charts are on Mercator's projection, which strangely exaggerates the space occupied by the land, especially in the high latitudes. This method only concerns itself to show the exact limit of the sea, as the object of the chart is only for the purpose of marking off the

exact position of the ship at mid-day after each run. There are charts on a larger scale for every sea, and special portions of each part of the coast. The approaches to harbours and the mouths of all the large rivers are surveyed with particular care, and there is a continual interchange amongst all nations of any charts showing alterations in the channels in the entrance to any harbour. Fresh discoveries of sunken rocks, or new coral reefs in mid ocean, are always notified by the marine authorities of all nations. In England, this is done under the authority of the Trinity Board. England, as becomes her situation and responsibility as the first maritime power in the world, has always maintained the lead in all these maritime surveys. The squadrons she keeps up in all parts of the world are constantly employed in the correction of existing charts, and she has conducted carefully conceived operations of deep sea soundings for laying the numerous telegraph cables which she maintains in all parts of the world. In Arctic expeditions and scientific exploration of the bottom of the bed of the ocean, England has ever been in advance of all the rest of the nations of the world. All this work forwards the happiness and prosperity of nations. A perfect map marks complete civilisation, and it shows that the labor of the astronomer has been complemented and completed by the measurer and the draftsman; and it is not till then that the work of the statistician and engineer can be fully and safely directed in furtherance of the happiness of mankind.

J. M.

IV.

MODERN FIELD ARTILLERY.

BY

MAJOR W. B. E. ELLIS, ROYAL ARTILLERY.

Such very decided improvements have been made in the armament, in the organisation, and in the tactics of the Infantry, and of the Cavalry, of our small army of late years, that the necessity of the Field Artillery keeping pace with the times must be patent to every reflecting Artilleryman.

Within the last 20 years great changes have no doubt been made in many important points connected with our Field Artillery. The armament and training have both undergone immense improvement. We are however proverbially averse to innovations in military matters, and hence our progress has been proportionately slow. There are indeed those still living who may remember the curious old times, or as some would call them, the good old days, when Field Guns were distributed in twos to battalions of Infantry, and to regiments of Cavalry. The former were then called battalion guns, and the latter galloper guns—and in this we may perhaps trace the now old fashioned terms by which the two portions of the Field Artillery used to be known—namely; Horse Artillery, and Foot Artillery—as if, forsooth, they were respectively Cavalry and Infantry Soldiers trained to the use of guns—and possibly this was really the origin of those terms. The disadvantages of this system fortunately led to its discontinuance, and the Field Artillery were then collected into bodies of 6 guns each—under which organisation indeed they are generally to be met with to this day. Two of these 6 Gun Batteries used, in our last continental War, to be attached to a division of the army, under a Lieut.-Colonel. But, in their actual working, these batteries were generally separated—and acted almost independently under their Battery Commanders—very often even on opposite flanks of their Division.

Such was the system till quite lately, when during the autumn manœuvres of 1871, some attempt was made for the first time, at handling Field Artillery in larger bodies under the direction of superior Officers of that Arm. Field Artillery, in fact, made quite an attempt to assert its position as a separate and distinct arm of the service, and it has ever since appeared to be more or less on the eve of great further development.

This modern tendency towards massing Field Guns not a little discomfited those who had been for so long accustomed to a very much larger share of independence and responsibility than any one else of equal rank in the Army. We mean of course the former first Captains—since Majors of Artillery, Whether pleasant or not however to individuals, there can be no room for doubt as to the very great expediency

of never permitting Field Guns to be used in such small numbers as a single battery—if we wish to reap the full advantages of that arm—for great and decisive results are infinitely more likely to be obtained by a “*feu d’enfer*” suddenly brought to bear from a large number of cannon, than by a long continued, if even better directed cannonade from a few guns. If, then, a force requires guns at all, it should have a sufficient number to guarantee a large amount of Artillery fire.

It did not really need the destructive experiences of the great Wars of 1859, of 1866 and of 1870, to prove the truth of this Artillery fact to any one who had studied the subject; but the numbers of guns employed, as well as the size of the Armies, on the Continent of Europe, are so great, that we cannot expect, with our forces, to place what foreigners would consider large masses of Field Artillery in action.

Let us now turn to a late organisation of an Army Corps in England, and examine how we then arranged the proportion of guns to men, and also the distribution of those guns to the different portions of the Army Corps. The Army Corps is said to comprise 30,000 Infantry—5,400 Cavalry—and 600 Engineers, or a total of 36,000 sabres and bayonets—and to this we find allotted only 104 Field Guns—which gives not quite 3 guns to every 1,000 men.

The distribution is as follows:—With the advanced Cavalry (2 days' march in front of the advanced guard) 6 guns; with the advanced Guard (the Light Division) 12 guns; with the 1st Division 6 guns; with the 2nd Division 6 guns; with the 3rd Division 6 guns; with the Reserve 20 guns; and two Brigades of Corps Artillery each of 24 guns; making the total of 104 Field Pieces. Six of the guns with the advanced guard, as well as those with the advanced Cavalry, and 12 of those with the Reserve are Horse Artillery Guns. Eight Reserve Guns are guns of Position—and the remaining 72 guns are Field Battery Guns. This gives a total of each description, as follows:—24 Horse Artillery 9 prs. 36 Field Battery 9 prs, 36 Field Battery 16 prs, and 8 Field Battery 40 prs. The proportion of 9 pr. and 16 pr. guns in the Field Batteries may be taken at one half of each as the armament of batteries is alternately with the one and the other. This shows a total of 60, nine prs—36, sixteen prs—and 8. forty prs. There is one point in the above organisation which will not fail to be noticed by the observant Artilleryman; and that is the extraordinarily small number of guns allotted to each Division. A Division as laid down for this Army Corps comprises 6,800 Infantry, 200 Engineers, and 600 Cavalry—or a total of 7,600 sabres and bayonets—and to this only 6 guns! This does not give even a proportion of 1 gun to every 1,000 men! In the Crimean days we had much more than this. Perhaps the Divisions have been so terribly stripped of their guns in order to give opportunities for bringing large masses of Artillery together, “*à la tactique moderne*.” Well, certainly, we find there are two Brigades of Corps Artillery formed; each of 24 guns—and a body of Reserve Artillery (though of mixed nature, being partly Horse Artillery and partly

guns of Position) comprising 20 guns. So far, so good—but it is not an unqualified good, as the Divisions are almost denuded of Artillery in consequence.

Let us see whether we have very far to go to find a remedy for this evil. Considering that the Rôle which Field Artillery has to play in modern battles is of such daily increasing importance—that the Armies we can put in the field are comparatively so small—that they are certain always to contend against vastly superior forces—that good Field Artillery is so difficult to extemporise—that indifferent Field Artillery is worse than none at all—that our troops may at any time be supplemented by auxiliary forces without any Field Artillery of their own—and that, moreover, we are a rich nation and willing enough to pay for Military efficiency—on all, and every one of, these grounds at least, and also in order to give to Field Artillery that development which its great tactical importance so urgently demands—we would strongly advocate a proportion of $4\frac{1}{2}$ guns per 1,000 to the total bayonets and sabres of an Army Corps. 36,000 men would thus require 162 Field Pieces, instead of the 104 at present allotted to them.

Leaving out the odd two guns, let us see how these 160 Pieces might be organised and distributed, always keeping in view the necessity of organising Field Artillery, as well as other arms of the service, so as to make their working units fit in with the altered tactics of the present day. It would seem on this account very advisable to modify the present battery and brigade organisation. By brigade in this instance, we mean the Regimental Artillery Brigades, not the Artillery Brigades formed in the Army Corps—which may or may not comprise batteries of the same brigade regimentally. This sentence will probably be Greek to any one but an Artilleryman—but possibly some may be able to understand it. If then it is decided that guns should be hauled in comparatively large bodies now a-days why not organise them without further delay into such units, under whatever name it may be thought best to give them?

The term brigade has been used at different periods for almost every number of guns that can be named. An Army Brigade, however, is generally understood to mean two or more regiments of Cavalry, or battalions of Infantry, brigaded together—and this is of course the simplest way of applying that term to Field Artillery—that is to say, two or more bodies of Artillery brigaded together under the command of one man. The question here arises of what number of guns should those bodies of Field Artillery consist?

The present 6 Gun Batteries are hardly large enough in some respects, or small enough in others. They are tactically such important and extensive commands as absolutely to demand the presence of a Field Officer at their head, and yet they are treated in many points of interior economy &c. in much the same manner as Troops and Companies—which are very much smaller in every way. Six Gun Bat-

teries are then too large to be treated in this manner, and yet not large enough to be given the self-contained independence of regiments or battalions. Again, batteries of 6 guns do not subdivide conveniently. They can be broken up into $\frac{1}{2}$ batteries of 3 guns each, or into divisions of 2 guns each. The first is an awkward number and separates the guns of one Subaltern's command, and is also too small on tactical grounds. The division is certainly much too small for independent action. If one division only is sent away, and this is the way to detach, if detachment be absolutely necessary, then 4 guns only remain. A battery of 6 guns cannot in fact properly bear subdividing in these days, as the entire battery even is already too small to work with that short, sharp, and decisive effect which *must* characterise a modern Field Artillery attack. There is not, that we know of, anything magical in the number 6, and it is well known that there have been and still are to be seen batteries of 4 guns, batteries of 6 guns, and also batteries of 8 guns—if we take the trouble to look about for them.

Besides, the present position of a Lieut-Colonel of Artillery is one that takes something more than a scientific education to understand—and those who belong to the red-coated portion of the Army are in a state of chronic puzzle as to what Lieut-Colonels of Artillery really command. They see, at different Stations where there happen to be a few batteries of Artillery, a number of pleasant and elderly gentlemen come and go in succession. And they may occasionally hear a word drop about Field Batteries or Horse Artillery in connection with them, but if any one attempts to explain their real position it at once becomes a case of, "that's a sort of thing that no fellow can understand."

Were we to do away with 6 Gun Batteries—and have only 4 guns in a battery—and then to keep at all times, when practicable, four such batteries together, or closely adjacent—we should obtain what might be called a good modern tactical unit—and also an homogeneous and self-contained body of Field Artillery for all purposes of interior economy and discipline—with its Lieut-Colonel commanding, and its Majors, Captains, Staff, and Band, &c., &c.

Such body of Field Artillery would in fact very much resemble in its constitution a regiment of Cavalry—and who will say that 16 Field Guns with the men and horses, and equipment they require, are not at least fully equal in every way to a regiment of horse? The name by which such body of Artillery should be known is immaterial—except that it could not be styled "regiment" as long as the entire body of British Artillery, numbering as many officers and men as an Army Corps, is still called by the name of "Regiment." Perhaps "demi-brigade" would do as well as any other name—as then two such bodies of 16 guns would form a brigade of Field Artillery of 32 Field Pieces.

Now, to return to the Army Corps organisation, which has been referred to above—and taking the different portions of that Army Corps from the head of the column, let us see in what manner we

would allot the 160 Field Guns we have proposed to substitute for the present number of 104.

To the advanced Cavalry we would give 16 guns—Horse Artillery with light 9 prs.—to the advanced Guard (Light Division) 16 guns—Field Artillery with 16 prs; to the First Division 16 guns—Field Artillery with 16 prs; to the Second Division 16 guns—Field Artillery with 16 prs; to the third Division 16 guns—Field Artillery with 40 prs; to the Reserve 16 guns—Horse Artillery with light 9 prs; and 32 guns—Field Artillery with light 9 prs,—total with Reserve 48. Also another Brigade (Corps Artillery) of 32 guns—Field Artillery with light 9 prs. Bringing the guns of the same nature together, we would thus have 32 Horse Artillery and 64 Field Artillery 9 prs or 96 nine pounders; 48 sixteen pounders; and 16 forty pounders.—The Army Corps as it stands at present has only 60 nine pounders; 36 sixteen pounders; and 8 forty pounders.

Regarding the constitution of the proposed Army Corps Artillery before the march—this could be very simple. There would be one Horse Artillery Brigade—and four Field Artillery Brigades, each of 32 guns. The Horse Artillery Brigade, and two of the Field Artillery Brigades armed with the light 9 prs; one Field Artillery Brigade armed with the 16 prs; and one Field Artillery Brigade armed with 16 sixteen pounders and 16 forty pounders.

It may be noticed that we propose to place the 40 prs. with the 3rd Division, instead of as at present with the Reserve. The reason for this is that those guns are slower of movement than the rest of the Field Artillery, and therefore would probably be unable to go rapidly to the point in the line of battle where they might be suddenly and urgently required. The crisis might easily be over while they were struggling with difficulties of country which would hardly be noticed by lighter Artillery. With the 3rd Division they would be early engaged and their powerful fire would be certain to open, and to make its mark on the enemy's position. All Reserves of Artillery should be capable of rapid movement—and some Horse Artillery is generally in Reserve for this very reason. The Reserve proposed above, namely, 16 Horse Artillery and 32 Field Artillery light 9 prs, would have a very telling effect, if brought up at the right moment to any one portion of the Field.

The proportion of Generals and Brigadier Generals of Artillery with an Army Corps, which the above proposition would entail, can hardly be said to be either out of proportion to the number of officers, of equal rank with the Infantry and Cavalry, or too many for the very large amount of Ordnance and material, and the numbers of officers, men, and horses, which such an Artillery mass would require. One General would command all the Artillery with an Army Corps in the Field, and an uncommonly fortunate man should he consider himself to live to fill such a position! There would also be 5 Brigadier Gene-

als, or one to each of the 5 Artillery Brigades. The Infantry, as arranged in an Army Corps, have 4 or 5 Generals and 9 Brigadier Generals. The Cavalry 1 or 2 Generals and 3 Brigadier Generals. This is of course exclusive of the Commander of the Army Corps.

When we propose to increase the number of guns in an Army Corps we must not lose sight of the fact that up to the present time it has been generally considered that the larger the number of guns the greater the impedimenta. But the construction of both guns and carriages has been so much improved of late years that we believe that it should be no longer necessary to report whether any given road is "practicable for Field Artillery," or not. Our experiences in Abyssinia and other very mountainous and difficult countries, has shown that Light Field Artillery can be taken any where. "Ubique," indeed, is their motto, and there they will go if required. We are referring of course only to 9 prs. and 16 prs., for it is possible that in some places it would be difficult for 40 Pounder Batteries to keep up with Infantry. There is much, however, remaining that could be lightened throughout our Field Artillery Equipment. Notably the ammunition wagons and some other carriages, the harness, and the stores carried by a battery.

The proposed replacement of the ammunition wagons by a system of limbers would we think give a fair opening for the more handy and compact working of large bodies of Field Artillery under one man. There would be no necessity for the 1st and 2nd lines of limbers to keep close up with their guns when on the march, as to each four Gun Battery there would be one spare wheel carriage carrying ammunition in its Limber, besides the Gun Limbers. This would give an average of $71\frac{1}{2}$ rounds per gun actually with the guns alone—and these could march in the general column by themselves, thus very considerably shortening the time taken to form the line of battle, after debouching from the lines of march. A most important point, and therefore a very great gain in these days. When this line of battle is once formed—the two lines of Limbers would of course lose no time in getting into positions from which they could rapidly keep up the supply of ammunition. The total number of rounds per gun on the Field would then be $179\frac{1}{2}$ or 718 rounds to a 4 Gun Battery. This is exclusive of Reserve Ammunition, and is only reckoning what could be carried by a Limber system, as compared to an equivalent equipment of the present pattern—which can only bring 148 rounds per gun to the front.

There have naturally been objections raised against the proposed limber system—and it may possibly be of general interest to give these somewhat in detail, together with the answers that may be made thereto.

Before entering into the more technical details connected with a Limber system, or with lightening of Artillery equipment generally, it may be as well to enumerate some of the principal desiderata of

Modern Field Artillery. First and foremost we require simple but very perfect shooting Ordnance, that is guns that will make very good practice up to the extreme point of accurate vision—which guns need not in themselves be so limited in weight of metal as some consider necessary. Any one who has laid a gun at objects over 3,000 yards away will be able to realise the folly of expending ammunition beyond that distance, unless the fire be upon some very large and fixed mark. The shells we use must be powerful and destructive—secure from premature explosion—and with reliable and simple fuzes, graduated at any rate as closely as the accuracy of the gun itself demands. With all this there must be plenty of rounds of ammunition carried with every gun. These conditions limit the calibre of Light Field Guns, and also the length of shells, on account of the great extra weight arising from even a slight expansion in either direction. It is most distinctly not the weight of the gun itself that cripples the movement of a battery, but the weight of its ammunition as carried on the present system—that is in all batteries that may be classed as Light Field Artillery. Next, we should have as much uniformity as possible in our equipment. The inconvenience, to use a mild term, which might arise on service from having guns of different systems and calibres, with of course as many varieties of ammunition and stores, is something terrible to think of. In India we are still in a most uncomfortable state of complication in this respect, as was very apparent at the last Delhi Camp—and even at home we mix 9 prs. and 16 prs. together in a most marvellous manner. Some continental nations are paying very particular attention to this very important point. Again, our ammunition should be so distributed and carried as to possess at least equal mobility with the gun and limber it has to follow and keep up with on service. We are rather far behind in this respect, as may be readily seen by those who will take the trouble to compare the weights respectively of our guns and ammunition wagons when fully equipped. The men to work our guns come next—if indeed they should not have been considered first of all. There would be immense gain in fighting power and efficiency, were we to have one and the same system of training for all men in the Field Artillery. Every man should be able to fill any gap in the ranks, whether it be among the men manning the guns or among those driving the teams—and of course from this uniformity of dress and equipment would follow “*Cela va Sans dire*,” but for all that—our Field Artillery at present contains two sets of men who will only fit into particular holes. Similarly with the horses. Every horse should be fit to be at once put in the wheel, or in the lead, or to be ridden singly. A battery is but imperfectly trained whose horses have to be kept in particular places only—and yet this is to a very much larger extent the case than is generally supposed—of course to carry this out thoroughly every horse should be saddled and harnessed in the same manner.

As to mobility being a necessary adjunct of Field Artillery, we as well as others, have for years written so frequently on this subject, that

there is danger of going over much well-trodden ground. This much we may however safely say. That, the Drill Books and the Regulations notwithstanding—that portion of the Field Artillery known as the Field Batteries will constantly be required to move rapidly when on active service—and if they have neither suitable arrangements nor opportunities given them to practise this celerity of movement in times of peace, so much the worse for us, if we are ever engaged once more in War with any European nation. There is a little story we have heard touching this Drill Book impediment, which may perhaps be thought somewhat to the point—but those who wish for more instances proving the disadvantage of want of mobility on the part of our Field Batteries both in the Peninsular and in the Crimea will find plenty to read in Napier and Kinglake or Duncan. Our latest little story is this. A certain Field Battery (in a column which had no Horse Artillery with it) was ordered to pursue defeated rebels in India at a gallop with the Cavalry. The commander of this Battery, so the story goes, said he could not gallop, but would pursue at a trot as Field Batteries did not gallop! Without hesitation the General called up another Battery commander, and repeated the order, and pretty sharply! The latter made no demur—on the contrary he was only too glad to give the go-by to his non-mobility “*confrère*.” The General however was not to give him his chance without knowing how it was that one Field Battery could gallop while another could not—his enquiries were met by the brief reply “—is quite right by the Drill Book General, but I have not got mine with me.”

The great expansion of Infantry formations and tactics in the latest forms of attack and defence, more than ever require Field Batteries to be able to move rapidly when they do move. We also require above all things in these days a large volume of Artillery fire, in order to create a rapid moral effect on an enemy, who may possibly not always suffer a very great actual loss. A rapid seizure by Guns of all positions at all suitable for Artillery, is one of the first acts of a battle. Changes of position, when made, must be to very distant points on account of the very great range of our guns; and must be made by large bodies of Artillery getting over the ground as quickly as possible so as not to suffer while on their way. Rapid reinforcement of Guns already in position is often called for. Sudden, and if possible unseen, opening of a rapid and concentrated fire from masses of Field Guns on the enemy's position is very effective. All and every one of these manoeuvres will be found ludicrously difficult to execute with effect with the Gunners on foot—or even carried about on the gun carriages in a manner that raises a smile of pity to the lips of those who understand what they are looking at.

But “*revenons à nos moutons*.” The Limber system to wit, and the objections that have been raised against it. We may as well take these *seriatim*—and give the replies in the same order.

Objection 1.—That the result Major Ellis hopes to arrive at by the changes he proposes, do not, in my opinion, sufficiently justify the

complete overthrow of our present equipment, a system which has stood the test of many years experience, and, so far as I am aware, has been found to answer well.

Reply 1.—The adoption of the proposed limber would do away with the present sized ammunition boxes only, as two out of the six wagon bodies per battery, after some alteration, would be required for the two proposed spare wheel carriages—and the remaining four wagon bodies could be utilised in the same manner in their turn. The remainder of the equipment would remain almost intact. The present system is indeed old if that is any recommendation, but with regard to its having answered well—innumerable instances could be quoted if necessary, to prove that the present ammunition wagons have been found to be a continual source of difficulty and obstruction both on the march and in the field—and the writer is quite willing to abide by the decision of those who have seen much marching and active service.

Objection 2.—That experience has proved that our present ammunition boxes are by no means too strong for the 18 rounds of ammunition and stores stowed in them; consequently an increase of more than one half to that weight would necessitate a much stronger, more substantial, and of course heavier box being used. (Major Ellis's experimental boxes are made exactly similar to the service boxes, except that they are two inches wider and three and a quarter inches longer.)

Reply 2.—This is a question which is open to a difference of opinion among Artillerists; and it may even be found that the service boxes if properly put together, and of good seasoned wood, are quite strong enough for what they now carry. Further, there are some very material differences of construction in the Experimental boxes—the particular technical details of which need not here be enumerated—but their direct effect is to make those boxes proportionately lighter, and at the same time stronger, and less liable to cracks and openings in the wood than the boxes of the present equipment. There is much useless iron removed—many injurious and superfluous rivets and screws are done away with. The bottom is fastened on by longer screws running up into the wood of the sides and ends, instead of as formerly into a false bottom—and existing iron bands are welded together across the grain of the bottom of the box.

Objection 3.—The present Limber would also have to be considerably strengthened to enable it to carry efficiently the extra weight of these experimental boxes and their contents.

Reply 3.—It is very astonishing that the wagon body at the present time carries the weight of 4 boxes of ammunition (in 4 boxes) not to mention spare wheel, spare shaft, boxes of shoes encased in heavy bands of iron, Picket posts, and the great weight of the frame-work itself—besides at times 4 gunners, and in England Tents, &c., &c. And yet no exception is taken to this. But when a Limber is proposed to

carry the contents of 3 boxes of ammunition *only*, in two enlarged boxes on exactly similar axle and wheels—then these should be all at once considered to require strengthening! Would a Dog Cart, in the habit of carrying four, need strengthening to carry only three?

Objection 4.—Major Ellis proposes that one of these Limbers should be drawn by 4, and the other by 2 horses. I feel confident that all limbers would require at least 4 horses at all times. A consequent increase to the number of horses allowed for a Battery would be required.

Reply 4.—The point of how well the proposed Limber could get on with two horses only, and under what circumstances four or more would be required can be clearly and definitely decided by actual experiment alone—and over every variety of country, and at the different paces at which the Limber might be required to move when in the Field. The experiments which follow will give at any rate a fair basis on which to form a judgment on this matter.

Objection 5.—That as there are spaces under the trays of each ammunition box which could hold 4 more shell—and 4 cartridges for those shell could be carried in each cartouche—hence 22 rounds could be conveyed by each service limber box instead of the present 18—which would give a total of 1,080 rounds with the 6 guns and 6 wagons. And as the Experimental Battery only proposes to carry 1,104 rounds in all, including its two spare wheel carriages, there would be a gain of 24 rounds only by the proposed alteration of system.

Reply 5.—It is true that there are spaces at present unoccupied in the service boxes, in which 4 shells might be placed. It is however more than doubtful that 4 more cartridges could be properly packed in the service cartouche. There would also be arrangements necessary for carrying 56 more time fuzes and 80 more percussion fuzes to make one of each kind for every shell, as is the case with the experimental limber. Supposing even that every thing were arranged for the conveyance of the 4 extra rounds complete of each ammunition box—what would be the effect of this additional weight on the ammunition wagon? The weight of a round complete cannot be put at less than $11\frac{1}{2}$ lbs. There are 6 boxes on each wagon, giving thus 24 extra rounds—the weight of these 24 rounds would be as nearly as possible 276 lbs. or $3\frac{1}{2}$ cwt. We all know the difficulties which already arise from the present weight of the service ammunition wagon, when it is required to move fast, or to march up or down very steep hills, or to get over nullahs, or across other natural obstacles, say, for instance, boggy ground. The addition of $2\frac{1}{2}$ cwt would very materially aggravate this evil—which has been already suffered to exist too long. The wagon, as it is, weighs about 7 cwt. more than the 6 cwt. 9 pr. limbered up, and the additional rounds would increase this difference to $9\frac{1}{2}$ cwt.! We should indeed very often have to sing “wait for the wagon.”

The following experiments took place at Secunderabad on the 9th August 1876. The Experimental Limber with two horses, and the service ammunition wagon with 6 horses, were paraded in "marching order." Three gunners were seated on the Experimental Limber, three on the Wagon Limber, and four on the wagon body. The horses selected for this trial were those of No. 1 wagon, and the wheelers of, No. 2 gun—and those who know how a Battery is generally teamed, will be able to judge that these horses were neither the best nor the worst that could have been taken—of course, except for simultaneously trying the proposed Limber and the Service wagon, it would be more satisfactory to use one Team only. Both carriages were now marched at a walk, with the Gunners on the carriages over an easy Pass between two rocky hills. There was no difficulty experienced so far.

A nullah was now met with having an easy slope on the near side but with an abrupt bank of about 2 feet high on the far side. The experimental Limber scrambled over this nullah, but not without difficulty. The wagon followed and also crossed with trouble, some slight damage was however caused to its harness from the severe jerk of the hind wheels against the opposite bank. The Gunners were of course dismounted before reaching this nullah. The pace at which both the Experimental Limber and the Service wagon crossed this nullah was a slow one, as it was considered less likely for Harness to break in this manner. With increased speed, and such a weight as a 9 pr. wagon, the chances of breakage, and of consequent delay would have been greatly multiplied.

After this some small nullahs, and a road with slight banks on either side, were passed over with ease. Presently a hill was reached which would certainly have offered some obstacle to the rapid progress of a column of the three Arms if forced to keep on that route. Up this hill the Experimental Limber was taken by two horses only without extraordinary difficulty, although near the top the slope was rather steep. The wagon followed up the same track with apparently about equal trouble. This hill was then descended by the same route. The Experimental Limber in this case showed a decided advantage, as it had no difficulty whatever in going down easily. A drag-rope was fastened on behind, but hardly any pull back was necessary to ease the weight on the horses. Before the wagon attempted this descent, it was considered necessary to put on the drag-chain and drag-ropes were also ordered to the rear. In going down it was found that the drag-chain could not possibly have been dispensed with, owing to the great weight of the wagon on the wheel horses. The drag-ropes were not perhaps absolutely required as well as the drag-chain.

After this, a double nullah with a mound in the middle was crossed. It was necessary here to drive so as to avoid this mound—which could only be done by making two very sharp turns. The advantage which a two wheeled carriage with only two horses, obviously possesses over a four wheeled wagon with six horses, was now very striking. The wagon

was quite unable to follow in the same track as the Experimental Limber, and the same would of course, have been the case had there been a precipice on the side of the road,—therefore, in such a contingency the wagon could not have travelled that way without being unlimbered and assisted round the turns.

The Experimental Limber and wagon were also taken to a rocky hill—which they had to ascend. It was now found advisable to put two additional horses to the Limber, making a Team of four horses. With these it readily mounted the hill, which was very steep in parts, and strewed with large loose stones, besides several rocks protruding out of the ground on the track which was taken. The wagon also got up this hill, but had to employ eight horses, and much exertion on the part of the drivers and their animals. This same hill had to be descended. In this instance the Limber had no trouble. The wagon found the drag-chain once more indispensable, and drag-ropes were to the rear also in case of necessity—and indeed they were not entirely useless in the steepest parts of the rocky descent. A drag shoe would, under the circumstances of the protruding rocks and large loose stones, have been to a certain extent dangerous, owing to the possibility of its being knocked out of its place during some of the jolts of the descent. The extra horses of both experimental limber and service wagon were taken out before going down this hill.

A nullah of the depth of a man and horse and with a number of boulders of rock in its bed, was now selected for experiment. The way down into this nullah was very steep, and the only way out was by making a very sharp turn at the bottom, and then ascending a very steep bank with a broken part at top. In order to descend with the Experimental Limber drag-ropes were required—as also to get it out of the nullah. Two horses only were used, and it was only after a very strong pull on the part of the Gun detachment and great exertion of the driver and his horses that the Limber was successful in extricating itself from its difficult position. Even had there been four horses to the Limber the leaders would have been in the way—not only going down the bank, but also in mounting the peculiarly difficult ascent out of this nullah. It was considered dangerous to take the wagon in and out of so awkward a place, and therefore this was left untried.

The gunners were now mounted again both on the Experimental Limber, and on the wagon, and these were then marched towards home. When about a quarter of a mile from the Gun Sheds the trot was sounded, the Experimental Limber leading the way at a smart trot—and its 2 horses did not appear distressed on arrival at the Gun Park. It should be here noted however, that it is not contemplated that the Experimental Limber should move freely at a trot (especially when carrying Gunners) without having a Team of 4 horses.

On August 12th the Experimental Limber was attached to a 9 pr Gun of 8 cwt. and paraded in “marching order.” Three Gunners were mounted on the limber, and two on the axle tree seats—and, with

the men thus seated, the gun was moved about at a brisk trot—and brought into action, and limbered up again, to the front, and to the rear, and to the right, and to the left—after this the gun was taken with the same men mounted, and at a fast trot, over the same easy Pass between the two rocky hills, which the Limber had crossed on the 9th with two horses. Not the smallest difficulty was experienced either in the halting, in coming into action—in limbering up—or in the free movement of the gun and carriage with 5 men mounted over ordinary country at a trot. There seemed to be no difference, to the ordinary observer, between the general working of this gun and Experimental Limber, and that of the Service Equipment.

On the 15th August the Experimental Limber was packed in "marching order" and attached to a Horse Artillery 9 pr. gun of 6 cwt.—and marched to the usual manœuvring ground in a Battery of Horse Artillery in "Drill Order." The Battery was then put through a short series of manœuvres—some of which were for action—and the whole of the movements were executed with that celerity combined with precision by which Horse Artillery has earned such world-wide fame.

The Officer commanding the Battery of Horse Artillery writes concerning this experiment as follows :

"It is difficult to give an opinion after only one morning's experiment—but as far as I could see—your Experimental Limber was quite as handy as the service one this morning—I had an ordinary Team in, and the horses didn't seem more distressed than the others—We only did a few movements as you saw—but they were fast. The ground was altogether favorable—being pretty smooth. After the first gallop, your limber was not halted quite so quickly as the others, but it was on a flank, and my order to halt may not have been understood quite so quickly as by the other subdivisions. I have as you know, the 6 cwt. Guns. The experiment of drawing the Limber alone (without the gun) with a Team of only 4 horses was quite successful—the horses moved quite freely and without distress. The wheel driver, a fairly intelligent man—says—that, "he experienced more difficulty in halting than with the service Limber—as the Shafts rose up a good deal. There seemed very little weight on the horses' backs, and no difficulty in moving off—in turning—or in bringing up the Limber for limbering up."

The Officer commanding the Battery of Horse Artillery further says, "I should think there would be no more difficulty in pulling up sharp with your Limber and my Guns, than with the old 8 cwt. Gun and Limber."

The "number one" (A Sergeant) in charge of the Gun which had the Experimental Limber says, "I consider from what I saw of the working of the Experimental Limber that it was quite satisfactory—

and there did not seem to me to be more stress on the wheel horses, either in pulling up, or in moving off, than with the Service Equipment."

On the 21st August. The Experimental Limber in "marching order" was attached to a 6 pr. Gun of 8 cwt. Three men were mounted on the Limber, and two men on the axle tree seats—and with these men so mounted the Gun was moved about at a sharp trot. It was halted for "action front" when moving down a gentle grassy slope at a swinging trot. Every horse stepping well out—and the Team was a flank one and therefore tall; excepting the Shaft horse, which was a rather small horse put in for the occasion. This horse had seldom been in the shafts before, and is a Sergeant's horse. It was found that the gun was pulled up to a halt within about 4 yards from the word "halt," "action front" being given—and no inconvenience was experienced in the way of the shafts flying up &c. In fact there was not apparently any difference between the working of this Gun with the Experimental Limber and that of the same Gun with the Service Limber.

The wheel Driver said, "The off wheeler that I drove was a "number one's" horse hooked in instead of my usual shaft horse. The "horses were trotting out freely down a little incline, and the shaft horse was trotting nearly as fast as he could—when the word "halt," "action front," was given. As I had been previously told to pull up "when at a trot, I immediately did so—and I halted the Gun in "about 4 yards. I did not have any difficulty in doing this. I have "been a wheel driver nearly 19 years and have pulled up the 13½ cwt. 9 pr. smooth bore gun for action when moving at a trot—with "large English horses 17 hands high."

It may here be remarked that the 8 cwt. 9 pr. gun, used in the above Experiment, and carrying five men, is altogether over 7 cwt heavier in draught, and to pull up, than the 6 cwt. 9 pr. of the Horse Artillery when attached to the Experimental Limber. The 6 cwt. gun really weighs as nearly as possible that weight—but the 8 cwt. gun averages 8 cwt. 1 qr. 7 lbs. There is also a difference of 1 qr. and 26 lbs. in the gun carriage. The average weight of the 5 men mounted on the Limber and axle tree seats is put down at 11 stone 9 lbs. Summing up then the actual difference in the weight of the two guns and carriages, and the weight of the three extra gunners carried by the Field Battery gun, we arrive at a total of 7 cwt. and 18 lbs.; and yet there was no difficulty in satisfactorily working the gun.

We must now leave for the present the consideration of that very interesting subjects "Modern Field Artillery"—with the earnest hope that some wiser heads than ours may follow up these feeble efforts at improving so important an Arm of the Service.

We were once fortunate enough to be engaged in conversation with a German Conqueror about the Army of Germany, and the Navy

of England—and were particularly struck with the reply he made—
“ Yass,” he said “ eet ees tru, vee hab vone Armee, bott our Nayvee
eet ees vone leetel baybee” ! We trust that this remark, reversed—
may not be found to apply nearer home.

W. B. E. ELLIS,
Major R. A.

SECUNDERABAD, }
August 1876. }

V.

MOVEABLE COLUMNS.

The object of this paper is to consider a reasonable offensive and defensive formation for a moveable column marching off the roads (in a country like India) during wartime and towards some place where its presence is urgently required, so that it may do so with the least loss of time and men and the greatest chance of arriving at its destination in efficient condition.

Bodies of troops such as moveable columns are frequently forced to keep only a flying connection with their base, not however permitting themselves to be absolutely cut off from it by superior numbers, but as it were disregarding the distracting attempts on flanks of small detachments of the enemy, sent expressly to interfere with their forward movement.

In the case of houses, comparatively distant villages, or broken ground occupied in a hostile manner by small numbers only—the Commander may waver as to the prudence of attacking or proceeding on his way—and by indecision lose time, whereas very often if he masked such places by detaching a few men to keep up a counter-fire on them and afterwards gradually withdrawing, the progress of the main body would be safe, and a halt unnecessary. But if an officer should be marching his command under like conditions in any but a fighting formation—it is much more exposed to stoppage by flank interruptions than otherwise might be the case.

An ordinary column of route with ordinary advance and flank guards is not sufficiently handy, a movement in line of columns is a preliminary order only and requires change of front &c., and columns of double companies are too massive and have not sufficient mobility.

It may be very well when the line of march (at a distance from the enemy) requires shortening—so to advance in double fours for a limited time, also prior to a direct, predetermined attack, but as a rule they are too close and too stuffy for every one, besides which the officers being in the centre cannot properly attend to their duties.

To speak generally—any dense formation is bad—also any requiring many internal changes before getting into fighting order, but a column of route in the ordinary sense is even worse, being exposed to flank attack along its length and being too extended to be strong.

All the foregoing indicate want of caution, and are dangerous in the presence of concealed Artillery and Cavalry, even though covered in a casual sort of way by skirmishers, during the advance.

Experience teaches, that it is better rather to under march than

over march troops in that stage which precedes action, that is to say men should be thoroughly in hand, and their battle organisation good, before risking the temporary disorganisation which contact with an opposing force may bring.

We find this particularly applicable to such columns as we are dealing with. If they can be able to *set out* on the march in such good form as to be prepared to offer resistance to attack to the front and both flanks without any but slight internal changes—and further to become aggressive almost as soon as the direction of the real design against them is apparent it will not be necessary to harass their Infantry by doubling long distances, in acting upon orders, possibly ill considered, but on the contrary it will be easy to supplement the strength at the point of danger with a calmness and decision consequent upon prearrangement.

It ought to be an axiom that no independent enterprise should ever be attempted by a moveable Column without its having at least a squadron of Cavalry attached to it, for scouting and reconnoitring purposes.

Nothing can exceed the value of such when well handled and well instructed, deprived of them, the main body loses a great proportion of its efficiency and must feel its way towards an enemy as a blind man with outstretched hands, but with a bright Cavalry commander who understands his work, and intelligent men to carry it out—the column commander may feel a confidence which enables him to advance with resolution.

It may be said that the necessity for Cavalry scouts is already admitted, perhaps so, but that the rule is sometimes broken we have abundant proof.

Now let us go over a few of the many uses of cavalry acting in this manner. Take the obstruction of shelter trenches, these are snares into which cavalry from their height on horse back and consequently longer range of vision, and line of sight from a different angle, do not generally fall because they can as a rule be discovered before reaching the margin of aimed fire, and possibly a means of turning them be found practicable—whereas with infantry it is not so—Other concealments also which might keep troops hidden from men on foot, fail to deceive mounted videttes, who can moreover dash round villages, (Indian) observe whether they may be passed, or should be avoided, and report accordingly without checking the march of the column.

Here it may be well to remember that if the column has a specific object in view—a distant point to gain—it is decidedly wiser to avoid suspicious villages or such like than to investigate them too closely:

To return to our subject—Cavalry Scouts with a small reserve prevent the too near approach of those of the enemy, and can give notice of projected moves on their part, shewing they are discovered and thus helping to counteract them.

Again, a moveable column can hardly keep up communications with flanks or base, without mounted aid.

Let us now turn to the Infantry with a view to disposal of them on the march. It may be asserted with truth that an Infantry Battalion moving alone in echelon of companies from a flank, covered by skirmishers is even in an open plain absolutely safe from successful attacks of cavalry who can be received in front by merely closing the skirmishes to a position clear of its fire, to either flank by wheeling up its companies, and to the rear by turning about.

In all the above cases the closed Skirmishers form a flanking defence instead of being a source of weakness.

Fired upon by Artillery, Infantry in echelon lying down is pretty safe for a few rounds, meanwhile their Skirmishers who are rarely made the direct object aimed at, may possibly creep onwards into rifle range, and by making it unpleasant for the Artillery cover the advance by rushes of the Echelon until the guns must either limber up and retire or keep changing their own range under small arm fire.

Against an attack or flank obstruction by Infantry an Echelon covered by Skirmishers in front and having a flank guard, would change this rather into its first fighting line, and by wheeling up in that direction, extending a company as reinforcement and two as second line, also closing its remaining companies and old skirmishers to company interval on the centre, parallel to the attack, be in the recognised order for such purposes without much delay.

In a frontal attack there would be even less difficulty in effecting the necessary dispositions.

The foregoing having been considered, the conclusion seems to be that a double echelon in phalanx form, covered in front by skirmishers, with rear and flank guards of Infantry, and above all with cavalry scouts and patrols ranging widely to the front and to right and left, is a safe and perhaps the safest way in which to distribute the forces at disposal under the circumstances to which attention is at present directed, bearing in mind that the formation necessitates a central guarded space for artillery, and for ammunition mules, water mules, light baggage, hospital and Mess dhoolies &c., without which no column can be independent, but it is assumed that no tents are allowed, so that the impedimenta being in hand, can fall back to the rear guard when it is required that the force should clear for action.

To enter more minutely into details let us suppose that the moveable column is composed, as here under, viz. :—

Three Battalions of Infantry.

One Battery of Artillery.

One Squadron of Cavalry.

Some Non-Commissioned officers of Engineers under an officer R. E., to whom all the Infantry Pioneers are attached.

A short pontoon bridge

Infantry reserve ammunition mules

Water mules. Forage mules.

One or two days rations for Troops, carried on mules or ponies.

Officers (very) light baggage.

One Mess dhoolie per corps—and a spirit ration per man, under canteen arrangements.

A percentage of Hospital dhoolies.

(No tents) Infantry carrying a rolled great coat and Blanket &c.

Cavalry in marching order with forage.

Artillery the same.

Infantry signallers, to take up messsages from a few cavalry told off for the advance, but behind the line of videttes.

The Force is formed in rendezvous order. Artillery on the right, Cavalry on the left, Infantry in line of quarter columns, at 12 paces interval in the centre, Baggage &c. in rear.

It does not matter in the least how they are all disposed provided they are concentrated so that officers and others can receive verbal instruction from the commanding officer and say personally if they understand them or not, (at which no general officer ought to take exception).

The general intention having been made known to the officers, and special instructions as to the direction of the advance having been given to the cavalry commander, &c. &c., the Cavalry, Artillery and centre Infantry Battalion are ordered to advance their own depth and 12 paces. The column distribute one Troop in front and flank videttes

and move. The Right half Battalion of the centre Infantry Battalion, forms double companies, advancing in extended order of Skirmishers and supports (as per regulation for attack) and following cavalry—who however are not bound to keep any very exact interval.

After these follow the remaining troop of cavalry or whatever men may not be required for the advance or flanks, then the Battery with as broad a front as possible, after which a double company of the Centre Battalion in the most convenient order, say advancing by fours from the right of companies, between them the Sappers and Massed Pioneers, and pontoons (if there should be any).

Then the baggage, ammunition, water and other mules, and ponies &c., in several lines—in rear of which another company of the Centre Battalion in support to the last one which forms the rear guard, in extended order. But in the meantime No. 1 and 3 Battalions of Infantry have each taken ground outwards, the distance of about half a Battalion from where their inward flanks rested while in Rendezvous formation and have each detached one company in extended order to cover their own immediate flank, and one company each as flank guard, in sections at intervals with connecting files and a flank-feeler (one file) per section.

The Skirmishers of No. 1 and 3 Battalions would be in rear and to the flanks of the supporting line of the central advance, and lastly as far as these Battalions are concerned they follow in echelon of companies from their inward flanks. (Moving in fours if more convenient). In the manner just described is the column started, it can be compressed if the nature of the ground requires it, but should resume its normal formation as soon as possible afterwards.

Next let us consider [the course to be adopted in the event of attack, or negative resistance to forward movement.

Desultory firing at a distance on a Flank when the cavalry scouts report the enemy to be in small force should be met by fire from marks men of the flank guard nearest the place firing and moving on afterwards, but the column itself should not be checked.

Determined opposition in the front should be overcome by a continued advance combined with a turning movement by bringing up one of the flank Battalions from echelon, covering fire by the guns.

For the force is in good fighting formation towards its front.

The baggage &c., should move to the rear, between the Rear guard and its support, and the ammunition mules, follow their respective companies at an interval.

In a flank attack, the flank guard extends and is supported or, rather reinforced by a company while the flank battalion wheels up and adopts the formation already described.

The companies of the Centre Battalion formerly in advance close to centre and move into echelon of companies on the flank of the attacked troop. The Rear Guard and its support form in echelon on the other flank. And if the attack is to the *left*. The Baggage &c. move direct to the right under charge of that double company *which was formerly in a central position* (of No 2 Battalion).

No. 1 Battalion which is supposed to be on the unattacked side, halts its own advance and flank guard, to cover attack by cavalry during the fight and moves in fours by companies to the left until clear of the baggage &c., when they can become a supporting line.

Naturally if the action is on the right flank, every thing in the above where "left" is put should be read "right."

The weak point would be that Echelon and side formed by the old rear guard and its support, but the cavalry not required to escort the guns, might watch it, indeed it is doubtful if the guns would require any escort at all as they would not move out of infantry protection.

Also it may be remembered that there is no reason to suppose that any of the foregoing movements need be executed in a scrambling or hurried manner for it is assumed that the cavalry scouts have given fair notice of the enemy's intentions.

To conclude, whenever the column arrives at that place where its services are specially required the commander is of course free to dispose of his troops in such a manner as will carry out his special designs.

Objections may be raised to the space occupied by a formation such as proposed, but in safe places, crossing bridges &c., with the front well covered it might defile, and form up afterwards, or the two flanking Battalions could turn inward by fours and wheeling inwards by companies move side by side after the guns, the baggage &c., with that double company of No. 2 Battalion near them dropping behind as a temporary arrangement. But if any suggestions put forward in this paper are thought worth trying, a few hours previous drill ought to be amply sufficient to enable the different dispositions to be carried out without confusion.

T. LYNDEN BELL, *Lieut, Col.,*
1-6th Regiment.

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